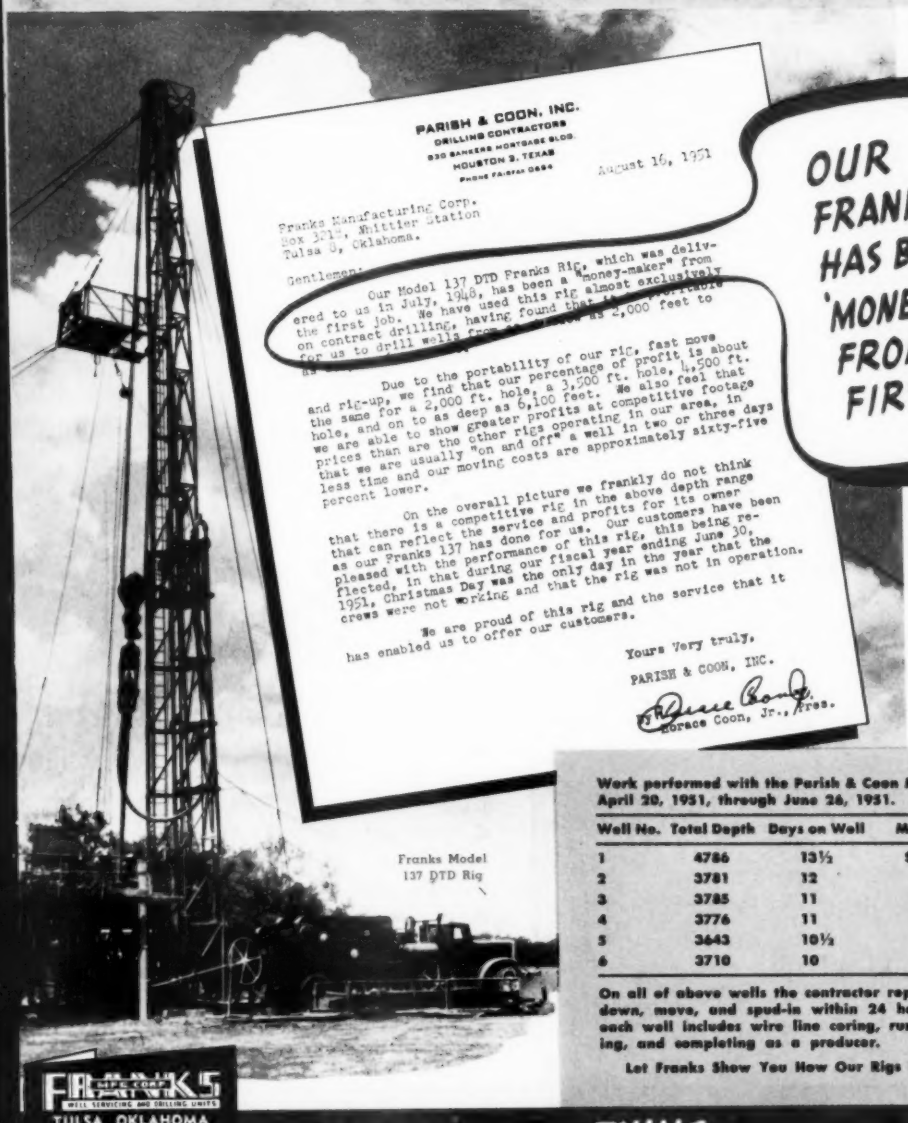
the OIL AND GAS JOURNAL



PARISH & COON, INC.
DRILLING CONTRACTORS
930 BANKERS MORTGAGE BLDG.
HOUSTON 2, TEXAS
PHONE FAIRFAX 0884

August 16, 1951

Franks Manufacturing Corp.
Box 3218, Whittier Station
Tulsa 8, Oklahoma.

Gentlemen:

Our Model 137 DTD Franks Rig, which was delivered to us in July, 1948, has been a "money-maker" from the first job. We have used this rig almost exclusively on contract drilling, having found that it [illegible] for us to drill wells from [illegible] as 2,000 feet to [illegible] and rig-up, we find that our percentage of profit is about the same for a 2,000 ft. hole, a 3,500 ft. hole, 4,500 ft. hole, and on to as deep as 6,100 feet. We also feel that we are able to show greater profits at competitive footage prices than are the other rigs operating in our area, in that we are usually "on and off" a well in two or three days less time and our moving costs are approximately sixty-five percent lower.

On the overall picture we frankly do not think that there is a competitive rig in the above depth range that can reflect the service and profits for its owner as our Franks 137 has done for us. Our customers have been pleased with the performance of this rig, this being reflected, in that during our fiscal year ending June 30, 1951, Christmas Day was the only day in the year that the crews were not working and that the rig was not in operation.

We are proud of this rig and the service that it has enabled us to offer our customers.

Yours Very truly,

PARISH & COON, INC.

Horace Coon, Jr., Pres.

OUR FRANKS RIG HAS BEEN A 'MONEY MAKER' FROM THE FIRST JOB

Franks Model 137 DTD Rig

Work performed with the Parish & Coon Model 137 DTD Franks rig, April 20, 1951, through June 26, 1951.

Well No.	Total Depth	Days on Well	Move Cost	Length Move
1	4786	13½	$261.37	13 miles
2	3781	12	239.20	13 miles
3	3785	11	137.80	660 ft.
4	3776	11	139.42	660 ft.
5	3643	10½	211.40	3 miles
6	3710	10	141.16	660 ft.

On all of above wells the contractor reported he was able to rig down, move, and spud-in within 24 hours. The time given for each well includes wire line coring, running and cementing casing, and completing as a producer.

Let Franks Show You How Our Rigs Can Meet Your Needs.

FRANKS MFG. CORP. FRANKS
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

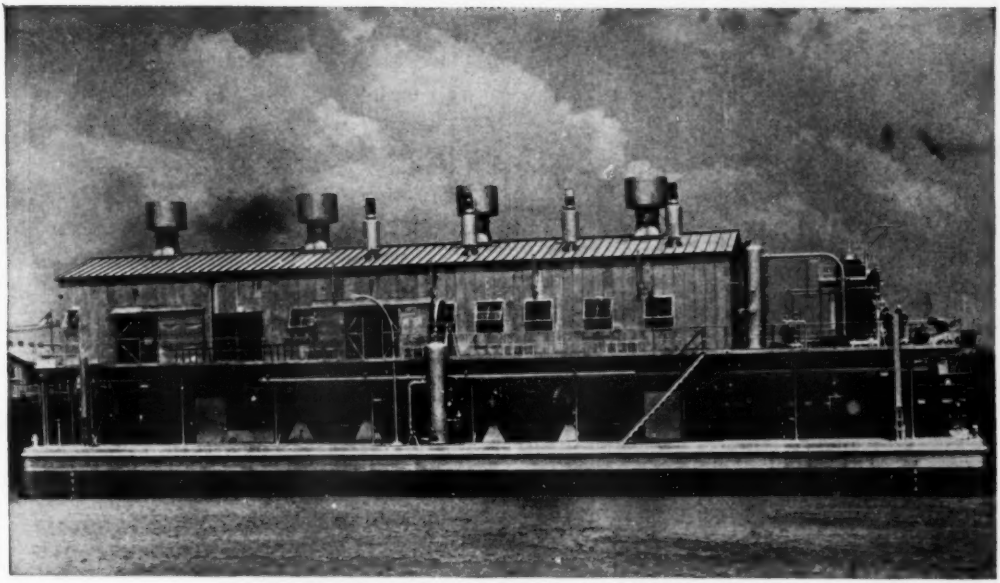
Work with Franks Latest THING, FIRST

PRICE 50 CENTS TABLE OF CONTENTS PAGE 73 SEPTEMBER 13, 1951

with **HALLIBURTON**
SUPERIOR
FLOATING EQUIPMENT

SAFETY is the keynote in floating and guiding casing into a well. Like the pilot's parachute . . . floating equipment must not fail even once. That's why successful operators throughout the world choose HALLIBURTON floating and guiding equipment. They know that every piece of HALLIBURTON equipment is designed, built and tested for faultless performance. Years of experience and thousands of safe, successful jobs tell the HALLIBURTON story.

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING



Developed by Bethlehem and Gulf Refining Company engineers, the first completely integrated Submersible Compressor Barge was built by Bethlehem's Beaumont Yard.

Bethlehem's Submersible Compressor Barge

For the Most Economical Working of Low Pressure Natural Gas in Shallow Water or Marshland

Length, 128 ft Width, 36 ft Depth, 10 ft

Five 300 hp Compressors

Daily Capacity 15,000,000 cu ft at 800 psi pressure.

- ★ Completely Integrated . . . Ready to Hook up to the Well.
- ★ Eliminates Need for Costly Erection Crews Miles from their Base.
- ★ Eliminates Need for Expensive Pile and Concrete Platforms.
- ★ Mobility, if and when Necessary.
- ★ 100 Per Cent Salvage.

Our engineers will be happy to supply further details on request.

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Baltimore Harbor	Beaumont, Texas
Los Angeles Harbor	San Francisco Harbor

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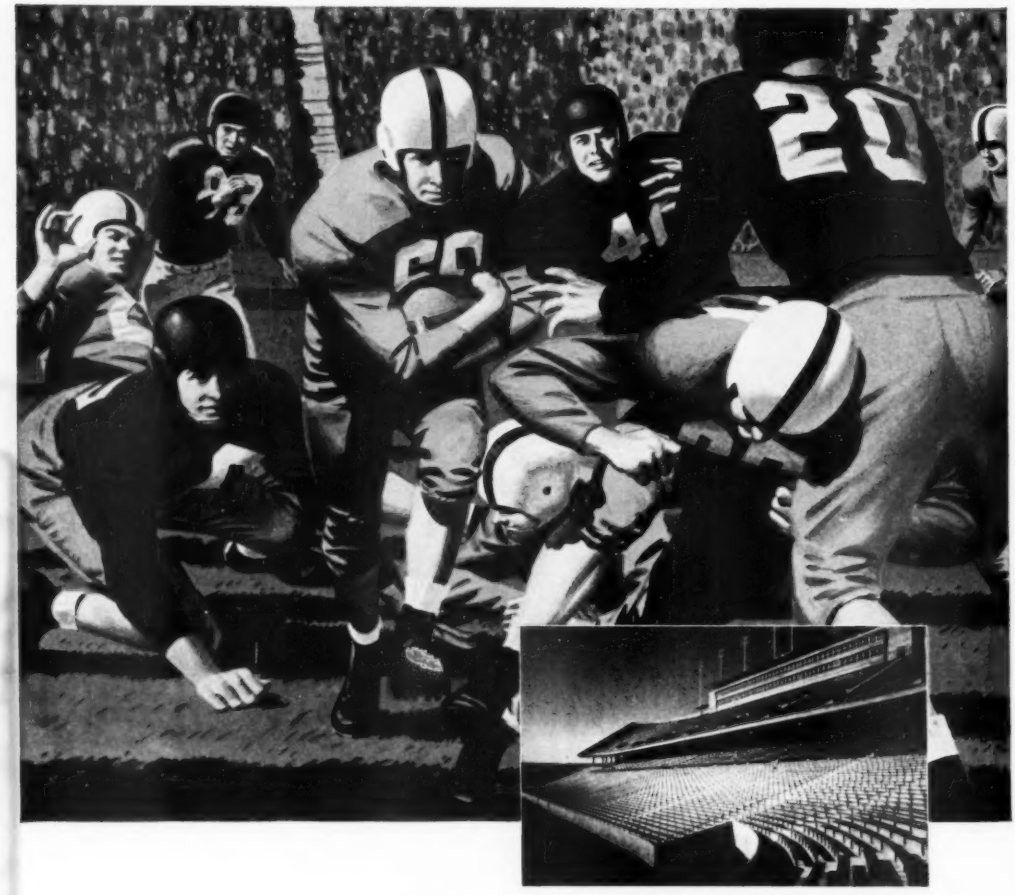
Shipbuilding Division

General Offices: 25 Broadway, New York 4, N. Y.

On the Pacific Coast shipbuilding and ship repairing are performed by the Shipbuilding Division of Bethlehem Pacific Coast Steel Corporation

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.



BIG ENOUGH FOR THE JOB

It can't be done! Everyone said so when The Rice Institute announced that Brown & Root, Inc., would build a new 70,000 seat Houston Stadium within nine months.

Brown & Root rolled up its sleeves, told Rice to go ahead with its plans to sell tickets to the opening game Sept. 30th. On that date, a capacity crowd filled the nation's most modern stadium!

We tell this story not to solicit stadium construction, for this was a labor of love, done on a cost-plus-nothing contract. But, as a result of Brown & Root's expediency, Rice had its new stadium, with three times more seats to sell, a full season ahead of normal completion date.

Brown & Root, with more than 30 years of engineering and construction experience, is proud of its reputation of making good jobs out of tough ones. A request from you will put a Brown & Root consultant at your service. No obligation, of course.

BROWN & ROOT, Inc.

P. O. BOX 3, HOUSTON 1, TEXAS

CABLE ADDRESS — BROWNBILT

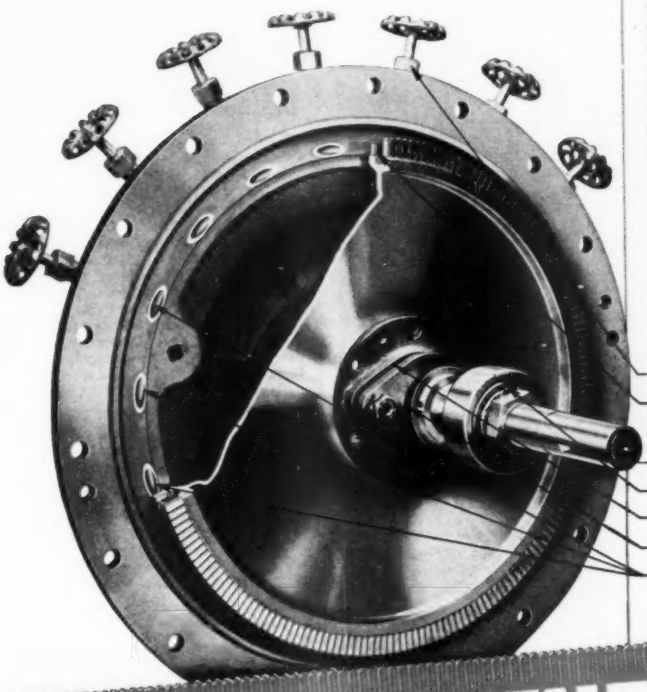
BROWN-BILT

Associate Companies:— BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS INC.

No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.



7 hand valves for efficient partial load operation, (20" turbine shown)

2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced

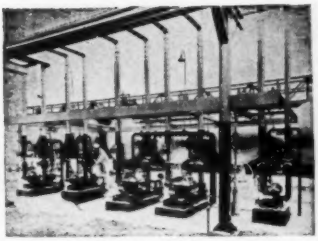
30-40 carbon steel shaft

Oversized double row deep grooved ball bearing

Stuffing box with metallic packing ring

Heavy chrome plating of shaft through stuffing box

3 nozzles always open



Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORP.,
270 Park Avenue, Worcester 2, Mass.
Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

TRADE PAPER EDITION
Published by
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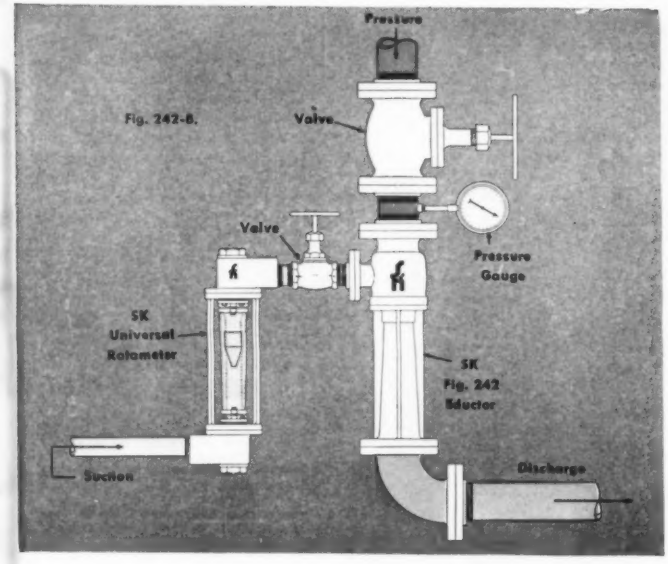
ENGINEERING News

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT •
ROTAMETERS • FLOW INDICATORS • ORIFICE TYPES • VALVES • SPRAY NOZZLES AND STEAM JETS • GEAR PUMPS • INSTRUMENTATION

HERE'S AN EASY WAY TO MEASURE AND MIX LIQUIDS INTO CONTINUOUS STREAMS



THE SYSTEM above is simplicity itself. It consists of a SK Rotameter and a SK Jet Eductor. It represents only one of numerous possible variations. With this system, you can mix two liquids in desired proportion in one continuous operation.

Flow of the pressure liquid is controlled by a valve and the orifice of the eductor nozzle. The pressure liquid passes through the eductor nozzle with sufficient velocity to draw in and entrain the suction liquid. Rate of flow of the suction liquid is measured by the Rotameter and controlled by a valve in the suction line. Both liquids are intimately mixed within the eductor to a degree not obtainable with most other types of mixing apparatus and are discharged through the discharge line. The mixing ratio remains constant as long as the pressures are held constant.

Of importance is the fact that the eductor has no moving parts—the Rotameter but one, the rotor. Maintenance, therefore, is low. Operation is consistently efficient. In addition, the eductor can be made of special materials to handle corrosive liquids.

The system is flexible. Additional liquids can be mixed by extending the system. SK Controlling Rotameters can be used in pressure and suction lines to proportion flows under changing conditions.

The SK Rotameter illustrated is a stock item, immediately available. SK Jet Eductors are built to meet job requirements. For details on the many types of Jet Eductors, request Bulletin 2-M. For information on all types of Rotameters, request Bulletin 18-RA. We'll send you either or both, promptly.

▲ At International Harvester Company's West Fullman Works, SK Rotameters, mounted on panels as shown in the photo, are used for test checking carburetors of various engines made by the company. The carburetors are installed in snap-jigs and are tested at low and wide-open flow—which corresponds to idling and full-speed operation. The Rotameters are used to check the air and fuel consumption. Since this is a production operation involving the checking of thousands of carburetors, instruments which indicate almost instantly were necessary. The SK Rotameters, after installation, met all specifications for both speed and accuracy. *For information on SK Universal Rotameters for panel mounting, request Bulletin 18-RB.*

SK Flow Indicators, designed to permit visual inspection of flow in a pipe line, can prevent damage to expensive equipment by indicating to observer whether or not a fluid is flowing. For information on the many types and sizes of SK Flow Indicators available, request Bulletin 18-W.

SCHUTTE and KOERTING Company
Manufacturing Engineers
73 CORNWELLS HEIGHTS
BUCKS COUNTY, PA.
Representatives in Principal Cities

piping maintenance costs more now!

You do less of it by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make

easy to use...easy to keep on the job

You'll have much less valve maintenance wherever you install Crane 600-Pound Small Steel Gates. Use with recommended trim on oil or oil vapor, steam, water, air, or gas.

Compact yet rugged—light yet strong—these are truly small steel valves with big valve features. They sacrifice nothing that insures dependability and tight seating, easy operation, and convenience in keeping them in top-notch working condition.

Supplied in sizes 2 inches and smaller, No. 3602 valves are engineered to the standards that make Crane Quality your best choice in valves of every type.

No. 3602 Small Steel Gate Valve

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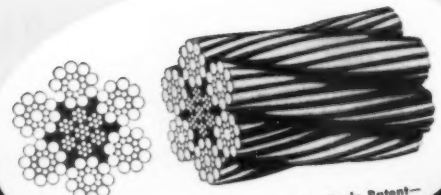
"American Tiger Brand

BEST SERVICE



American Tiger Brand 6 x 19—Seale Patent—
7 x 7 Independent Wire Rope Core.

WHAT'S THE BEST ROTARY DRILLING LINE? Contractors like Tiger Brand 6 x 19 Seale Patent Monitor Excellay Preformed IWRC. It gives most ton-miles of service per dollar of wire rope cost. Photo shows Clif Tamberlin, driller for Fleet Drilling Company on rig No. 2.

Wire Lines GIVE US THE

OF ANY WE HAVE EVER USED"

says Clif Tomberlin, Driller for Fleet Drilling Company

● The Fleet Drilling Company, at Ada, Oklahoma, operates 17 rigs and has had plenty of experience with various kinds of wire lines. The rotary drilling line they like best is American Tiger Brand 6 x 19 Monitor Improved Plow Steel Excellay Preformed with Independent Wire Rope Core.

The driller on the No. 2 rig, Clif Tomberlin, said "American Wire Lines give us the best service of any we have ever used." The line on the rig had already drilled one well and they were drilling at 6500 feet when these photographs were taken. The original lubrication was still good and the rope was in A-1 condition.

This particular line, Tiger Brand 6 x 19 Seale Patent with Independent Wire Rope Core has become most popular in the oil fields. It has just the right combination of strength, flexibility, fatigue resistance and abrasion resistance to give longest service at least cost. It also has superior resistance to crushing which is especially important on deep wells.

Tiger Brand Wire Lines are made for every oil field use—drilling, well servicing, pipe-line laying or what have you. Send the coupon for our handbooks giving complete information.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

TIGER BRAND WIRE LINES on Fleet Drilling Company Rig No. 2. These lines have already drilled one well and the original "Tiger Lube" put in at the factory is still in good condition. This lubrication does not throw off in hot weather or get too stiff in cold weather.

SEND FOR THESE BOOKLETS

American Steel & Wire Company
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Cleveland 13, Ohio

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☐ "Valuable facts about the use and care of Wire Rope."

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Excellay Preformed

UNITED STATES STEEL

In the 50 years since Spindletop

Fluor is proud to have served the

gas treating plants

gas compressor stations

natural gasoline plants

SINCE 1890

crude oil units

processing units

Including pyrolysis, hydrocracking, desulfurization, alkylation, etc.)

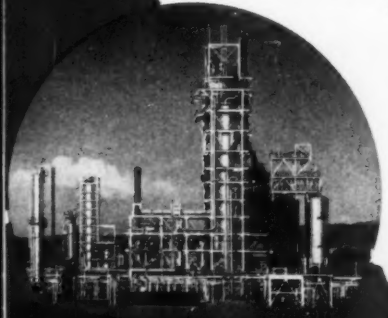
Over 100,000 BBL/D capacity!

FLUOR

petroleum industry in these many ways

The steady growth of The Fluor Corporation goes hand-in-hand with that of the petroleum industry since the first *big* discovery of Texas oil at Spindletop. Fluor's engineering and construction personnel were engaged primarily in heavy industrial construction just prior to Spindletop. Soon after Spindletop, the company's engineering and construction skills found ready acceptance by the rapidly expanding petroleum industry.

First contracts called for the design and construction of gas compressor stations. Next came work in gasoline processing plants. Then followed the design, engineering and construction of major refining units. Today Fluor is recognized as one of the nation's major engineering and construction organizations. Whatever your plans might include—a completely integrated plant or the expansion of existing facilities—Fluor's accumulated experience in the petroleum refining, gas-gasoline and chemical processing industries is at your disposal.



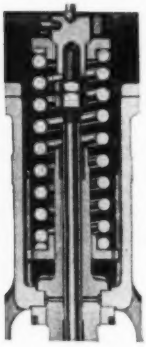
catalytic cracking units

COMPARE

THIS FEATURE

OF THE HONEYWELL SERIES "700" VALVE

DUPLEX UPPER STEM GUIDE



Two bearings guide stainless steel upper valve stem. Top bearing is self-oiling; lower bearing is lubricated by an easily accessible grease cup. Continuous lubrication assures almost frictionless super structure responsive to slightest change in signal air pressure.

Specially Designed Neoprene Diaphragm

One-Piece Bonnet

Packless Bellows Seal

Safety Stem Lubricator

Wide Variety of Discs

Reversibility in the Field

✻ Compare the Upper Stem Guide of this valve with that of any other wide band proportional type. Look at it closely . . . study it feature by feature.

Then check the other features of the valve . . . the Specially Designed Diaphragm, the One-Piece Bonnet, the Packless Bellows Seal, the Safety Stem Lubricator, the wide variety of discs, the easy reversibility in the field.

Your comparison will prove that the Honeywell Series 700 has *all* of the features you look for in a fine valve.

It's available in a wide range of styles and sizes. For detailed information, write for a copy of Bulletin 700-3 or call in your local Honeywell engineer . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 1906 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

New Bulletin 750, "Control Valve Sizing Data," is now available

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Valve Products

We're in stride with the pipe-line industry

The science of transmitting oil and gas by pipe line is still relatively new. Improvements are being discovered every day. Progress is being made all along the line.

And along with this pipe-line progress, the Bell Telephone System is advancing the science of communications.

To pipe-line men the Bell System brings long years of experience devoted exclusively to communications. We provide—by coaxial cable, microwave radio and wire—a wide variety of services. They include private-line telephone, mobile telephone, teletypewriter, and channels for telephotograph, metering, remote control and other signaling. In these fields our research is continuous and our experience country-wide.

We have applied these various communications methods to pipe-line needs and we are continually improving their application. To pipe-line men this means that their communications will be the best for their individual needs.

•

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

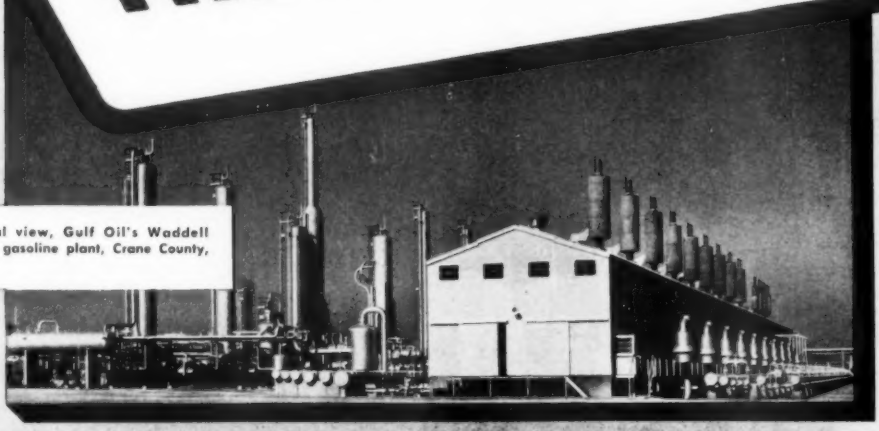
TELETYPEWRITER

MOBILE TELEPHONE

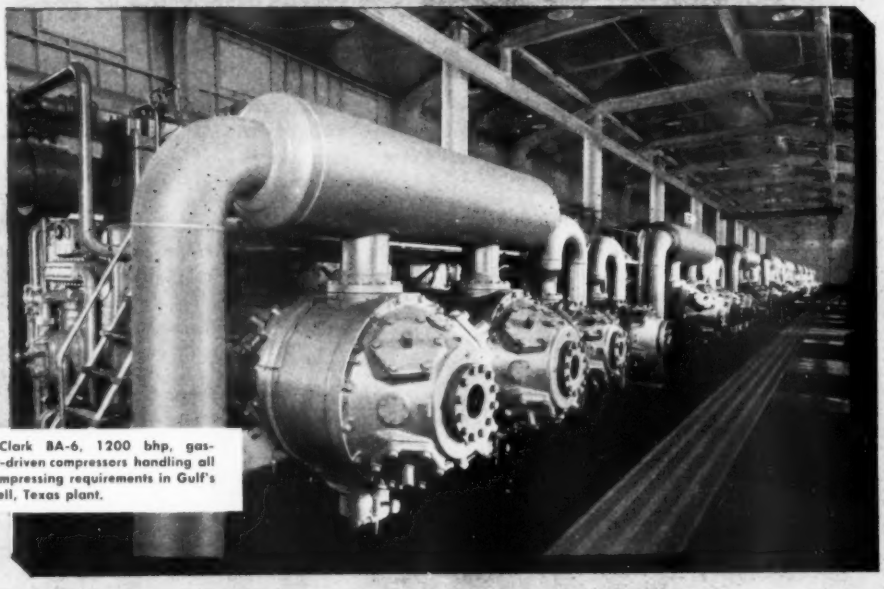
METERING CHANNELS

BELL TELEPHONE SYSTEM

THE TOUGH ONES



General view, Gulf Oil's Waddell natural gasoline plant, Crane County, Texas.



Nine Clark BA-6, 1200 bhp, gas-engine-driven compressors handling all gas compressing requirements in Gulf's Waddell, Texas plant.

Invariably **GO TO CLARK!**

For compressing 40,000,000 cu. ft. of gas per day under difficult conditions at Gulf Oil's Waddell, Texas plant, Clark Compressors were given the job

Compressing 40,000,000 cu. ft. of raw gas per day from 20 psig. suction to 600 psig. discharge pressure is a man-sized assignment under *any* circumstances. But, at Gulf Oil Corporation's Waddell gasoline plant, conditions present a *real challenge* . . . a particularly tough one . . . and Clark Compressors were given the job!

For here, in Crane County, Texas, Gulf is working with a two percent hydrogen sulfide gas. And Gulf is drawing this gas (containing 980 lbs. of water vapor per million cu. ft.) from seven different fields . . . a condition which naturally involves considerable variation in the composition of the stream and is bound to affect the constancy of operating results.

So, as one would expect, a complex problem was faced in meeting the three-compression-stage requirements. But the fact that Gulf is experiencing highly satisfactory performance from Clark Compressors in other installations . . . the fact that Clark "Big Angles" are widely known for their great flexibility of compressor cylinder staging — their smooth, flexible operation under varying pressure conditions — their super power and compactness that effect savings in building, foundation and maintenance — *all played a part in Gulf's decision to go to Clark!* Nine Clark 2-cycle, BA-6, gas-engine-driven compressors, 1200 bhp each, are doing the job with eminent success.

Complete data and literature on Clark Compressors are obtainable from your nearest Clark representative.

SEE the difference in

CLARK COMPRESSORS

CLARK BROS. CO., INC. ***One of the Dresser Industries*** **OLEAN, N. Y.**

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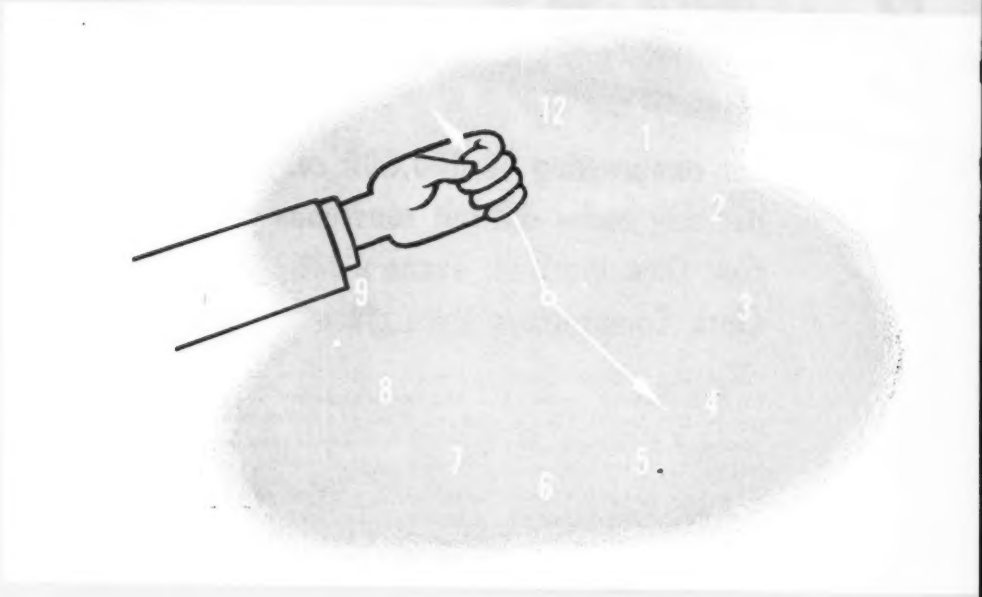
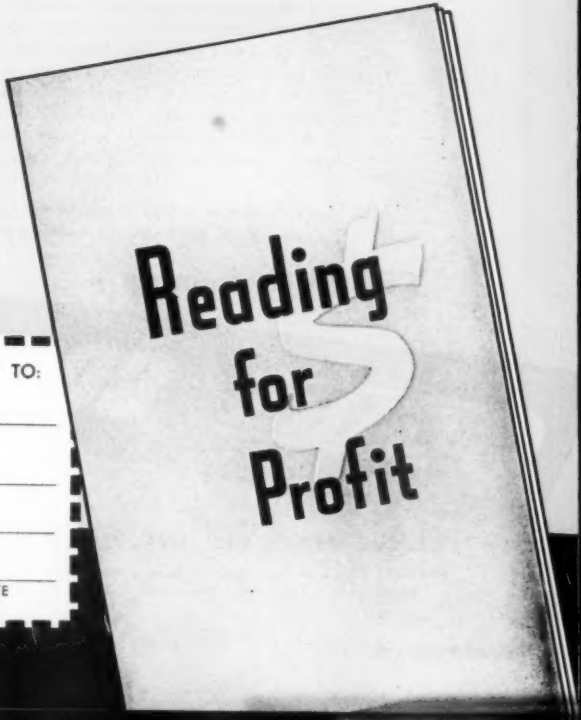
If You Can't Stop the Clock . . .





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Reading analysts know that most business men have the ability to read much faster than they actually do. A little practice in improved reading techniques will increase their reading speed from 20% to 300% in just a few weeks. You may be one of the many thousands of keen-minded men who need only to know what these methods are in order to get MORE benefit from LESS reading time. Equally important, speedier reading also gives quicker, fuller grasp of facts, and memory of them.

"Reading for Profit" is a booklet prepared as a public service by The Oil and Gas Journal, to acquaint more business men with the simple principles that whip up reading speed. It is yours for the asking. It can be read in five minutes . . . yet it can mean so much to you . . . your career . . . your business.

Fill out and mail the coupon . . . NOW . . . for your complimentary copy of "Reading for Profit."

the OIL AND GAS JOURNAL

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NO 'BRAKES' ON FLOW

Filling or emptying... small storage tank or huge tanker... lading flows faster through A.C.F. CYLINDRICAL Lubricated Plug Valves. The passage through the valve does not slow the flow, since it has at least as much area as the pipe. There is no 'throttling' effect with A.C.F. Valves!

A.C.F. CYLINDRICAL FULL PIPE AREA **PLUG VALVES**

Representatives in 50 Principal Cities

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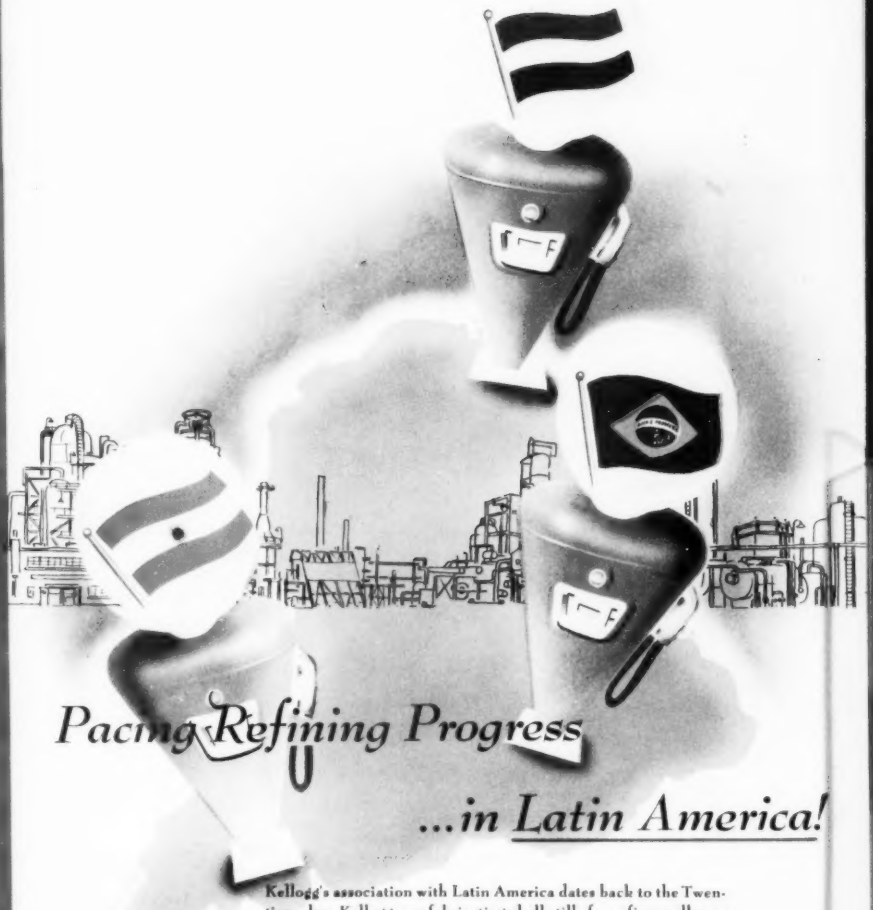
PAN AMERICAN REFINING CORP.
PENNZOIL CO.
PHILLIPS PETROLEUM CO.
POLYMER CORP., LTD.
PURE OIL CO.
SHELL CHEMICAL CORP.
SHELL OIL CO.
SHERWIN-WILLIAMS CO.
SINCLAIR REFINING CO.
SKELLY OIL CO.
SOCIETE DES RAFFINERIES DE PETROLE DE LA GIRONDE
SOCIETE GENERALE DES HUILES DE PETROLE
SOCIETE INDUSTRIELLE BELGE DES PETROLES
SOCONY-VACUUM FRANCAISE
SOCONY-VACUUM OIL CO.
E. R. SQUIBB & SONS
STANDARD OIL CO. (INDIANA)
STANDARD OIL CO. (OHIO)
STANDARD OIL CO. OF CALIFORNIA
SWIFT AND CO.
TEXAS CO.
UNION OIL CO. OF CALIFORNIA
UTAH OIL REFINING CO.
WASATCH OIL CO.
WOOD RIVER OIL & REFINING CO.



Pacing Refining Progress ...in Latin America!

Kellogg's association with Latin America dates back to the Twenties, when Kellogg was fabricating shell stills for refiners all over the world. These early contracts led to the design and construction of many key sections of the original refinery at Aruba. In subsequent years, as this refinery was continually modernized, Kellogg installed thermal cracking and hydrogenation units and also Latin America's first Fluid catalytic cracker.

Today finds Kellogg active further South. Within the year, the company has put on stream Brazil's first complete cracking refinery . . . started an expansion to double its capacity, also adding cat poly and LPG facilities . . . and initiated work on a 10,000 BPD complete refinery at Rio de Janeiro.

Concurrently, in the Argentine, Kellogg has placed a complete toluene plant on stream at Campana and started construction on a 30,000 BPD refinery at La Plata. This project includes the most advanced high-octane processes—Fluid catalytic cracking, catalytic polymerization, and alkylation—as well as topping, vacuum flashing and delayed coking.

THE M. W. KELLOGG COMPANY

A SUBSIDIARY OF PULLMAN INCORPORATED

for fifty years an integral part of processing history

NEW YORK JERSEY CITY LOS ANGELES TULSA HOUSTON TORONTO LONDON PARIS

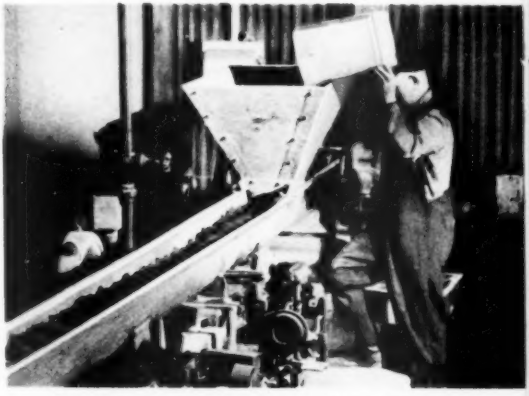
Portrait at

This year is Kellogg's fiftieth of service to industry. At this time naturally, as a group of men—known collectively to the modern business world as The M. W. Kellogg Company—we can think back nostalgically. We can remember the chimney stacks

Meeting the Toughest "Specs"...

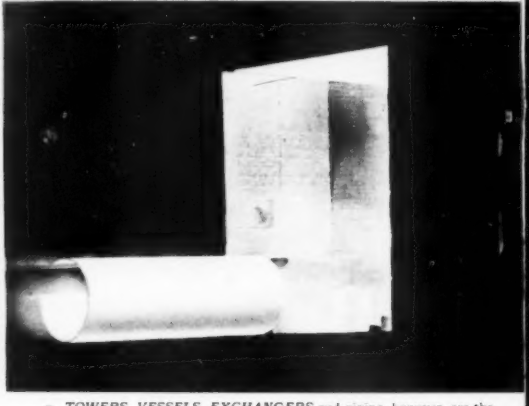
In previous issues of this magazine, camera "portraits" of M. W. Kellogg today have highlighted the major aspects of Kellogg's broad research, development, engineering and procurement activities.

This month, Kellogg's manufacturing operations, largely centered in Jersey City, New Jersey, come within the lens. Some of these operations are continuations of various phases of the original metal fabricating business from which the modern company stemmed. Others had their inception as outgrowths of Kellogg's research and development activities... when the company undertook the manufacture of new equipment and materials which were not commercially available but which were required to meet improved engineering specifications.



1. *WILLINGNESS TO PRODUCE SPECIALTY ITEMS* is readily apparent in this catalyst manufacturing phase of the company's operations. When cat poly and hydroforming were being introduced into commercial refining, there was no readily available source for the special catalysts desired. Consequently, Kellogg undertook their manufacture and, today, two plants in Jersey City continue to produce these specialized materials.

4. *FROM THE SAME MILL* came a special transition piece (test piece illustrated) which solved a problem in the design of 1050 F power piping installations. The piece is used to join two types of alloy piping with widely varying coefficients of thermal expansion. It is so cast that the analysis of each end matches that of the piping to which it is joined. The result: elimination of excessive weld stress at elevated temperatures.



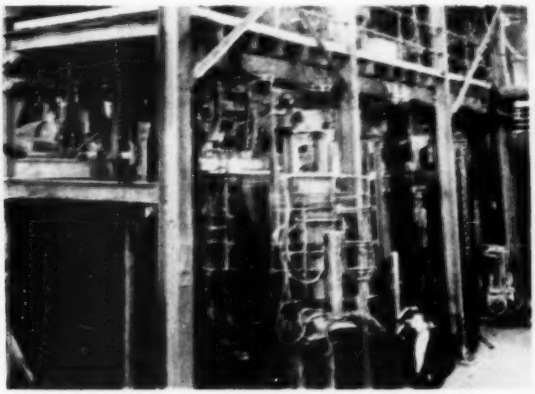
5. *TOWERS, VESSELS, EXCHANGERS* and piping, however, are the principal products of the shops. Facilities are complete, from plate forming to precision machining. The shops are employed in three major ways . . . to build prototypes of Kellogg-developed equipment; as a prime supplier on refinery construction contracts; and to manufacture custom-made equipment for direct sale to the process industries.

Fifty... no 8

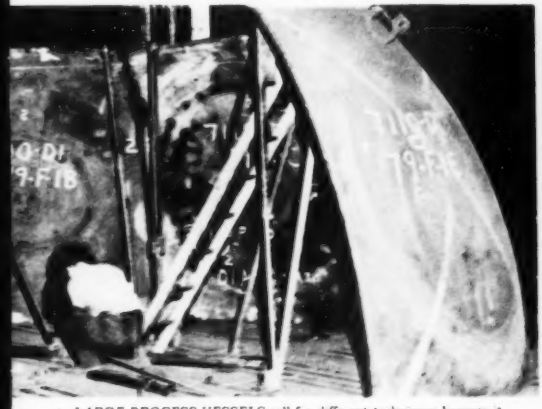
KELLOGG
1901-1951
50th Anniversary

we built in 1901 . . . the first crude vessels for oil refiners in the 'teens . . . our first combination unit. The forty-odd Fluid cat crackers built in these years. But, after all, The M. W. Kellogg Company is only a factor as it is able to serve industry today. For that reason, we are presenting this series of monthly camera studies which document our belief that a truly integrated organization can better serve industry to achieve greater earning power. This is No. 8 in the series.

2. ***A SIMILAR SITUATION*** placed Kellogg in the refractories and refractory products business. These products play so large a part in most industrial processing projects that years ago the company developed materials specifically suited for process plant applications. Currently, these materials are made to Kellogg specifications and sold under such trade names as Ignisite, Kel-crete, Kel-block and Thur-Ma-Lox.



3. ***PROBABLY THE LAST THING*** you would expect to find at Kellogg would be a steel mill. Yet, this unique electric steel plant at Jersey City, outgrowth of Kellogg metallurgical research, is continuously producing alloy ingots with exceptional mechanical properties. The process assures a constant analysis throughout the cross-section of the ingot which explains why jet turbine manufacturers are steady customers for this steel.



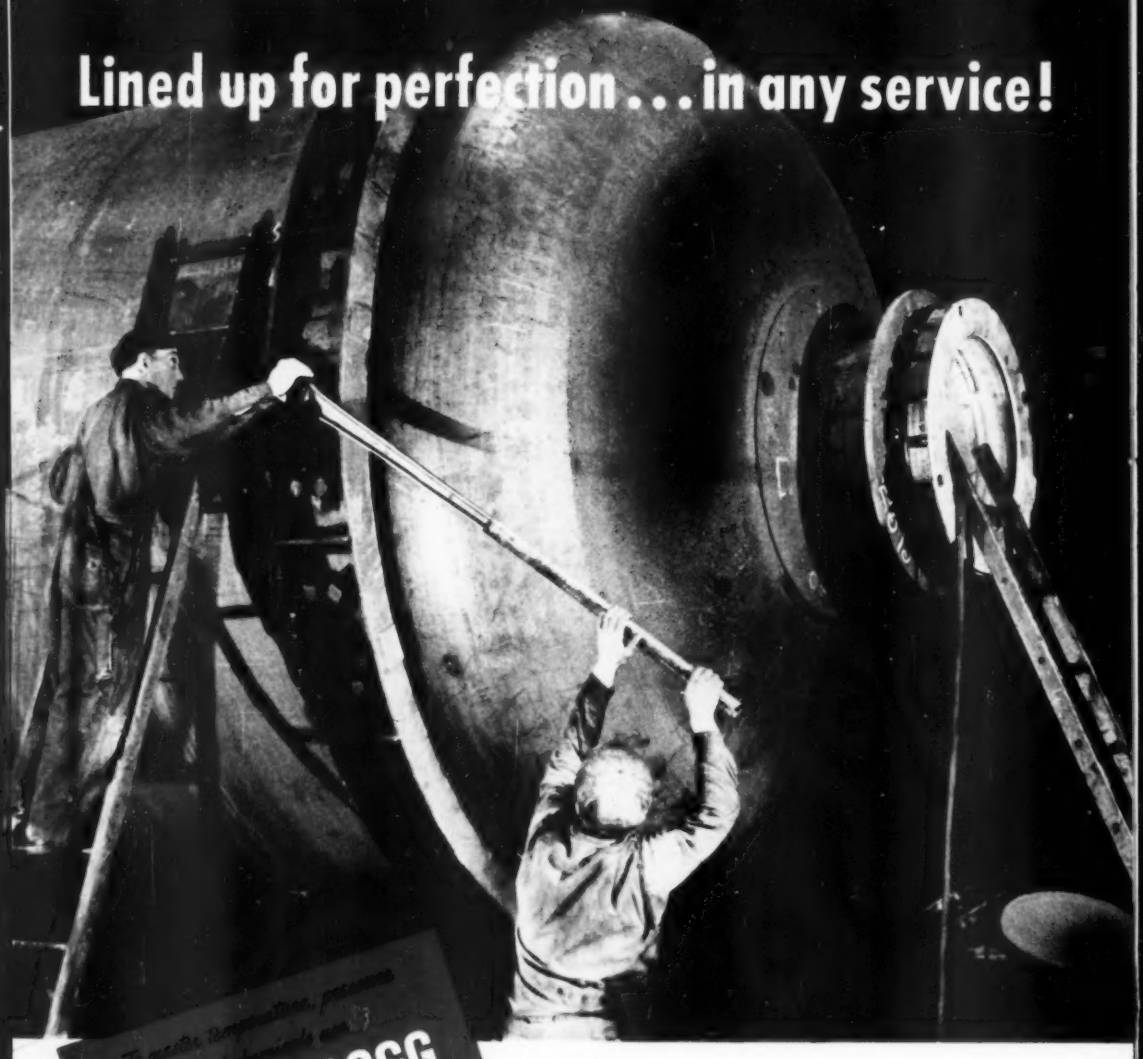
6. ***LARGE PROCESS VESSELS*** call for different techniques because it is frequently impossible to ship them completely assembled over inland rail routes. Kellogg has developed two solutions to this problem. First by floating vessels to their final locations over inland waterways. Second, and more recently, by knockdown fabrication of carefully matched segments in the shop as shown in the accompanying picture.

7. ***THE IMPORTANT ROLE OF WELDING*** in the fabrication of equipment is underlined by the fact that the company maintains a special *Welding and Welding Practices Research Group*. Since 1931, this group has been closely associated with such developments as continuous welding, inert gas welding and other techniques with the result that today Kellogg's equipment is among the most modern available.

NEXT MONTH

. . . in the ninth of this series of camera studies of M. W. Kellogg today . . . you will glimpse a few of the specialized, and in many instances unique, techniques employed to improve the quality of manufactured products.

Lined up for perfection . . . in any service!



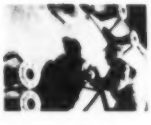
To master temperature, pressure and chemicals over a wide range of operating conditions

M. W. KELLOGG

In digestors for pulp mills . . . special towers for fatty acid splitters . . . refinery vessels, large and small . . . in equipment for any processing task, Kellogg's accurate line-up techniques, preparatory to welding, pay off in peak operating performance and longer service life.

Pressure Vessels
Vacuum Vessels
Fractionating Columns
Drums and Shells
Heat Exchangers
Process Piping
Hi-pressure—Hi-temp Power Piping
Bends and Headers
Giant One-Piece Bends
Forged and Welded Fittings
Radial Brick Chimneys

Continuing Study of behavior of metals under stress at high temperatures has produced valuable design data.



Shop Layout Craftsmen are fully experienced in vessel fabrication from nozzle positioning to "knockdown" fabrication for field assembly.

Extensive Facilities from forming of plate to final machining of precision surfaces permit complete fabrication under the same roof.

Special Welding Techniques and stress relieving methods assure equipment performance even under severest operating conditions.

Rigid Quality Control, devised by specialists, including chemical and micro analyses as well as mechanical and non-destructive testing.

NEWS FOR OPERATORS IN WESTERN CANADA!

The Canadian Kellogg Company Ltd. has established complete shop facilities for the fabrication of all types of piping at **EDMONTON**, Alberta. Inquire directly or through any Kellogg or Canadian Kellogg office.

The M. W. Kellogg Company (A Subsidiary of Pullman Incorporated) New York, Jersey City, Los Angeles, Tulsa, Houston, Toronto, London, Paris

J&L STEEL
SUN MON TUES WED THURS FRI SAT
1 2 3 4 5 6
7 8 9 10 11 12 13
14 15 16 17 18 19 20
21 22 23 24 25 26 27
28 29 30
SET A Scrap Day IN YOUR ORGANIZATION!

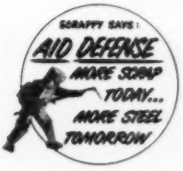
Set a definite day . . . soon . . . to start rounding up all the dormant scrap in your operation. Extra scrap is urgently needed to keep mills at expanded steel production.

Here's what's wanted

Steel producers must have scrap over and above the "working scrap" that you normally sell. Broken or obsolete machinery and equipment . . . odds and ends . . . worn out parts—in fact, *all* the iron or steel material that's rusting away in your plant or operation. Get it out of the way . . . get it on its way into production.

Here's what to do

Set a definite day to start . . . make scrap collection the definite responsibility of one man or one group. Call your scrap dealer. He'll take all the scrap you can collect and pay you well for it.



Set YOUR Scrap Day NOW!

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

Now CMH *offers*

a proved expansion joint for pressures up to 5500 psi

Advancements in the design of the CMH FLEXONIFLEX Expansion Joint—the "proved-in-service" high pressure expansion joint—now make it possible to offer units for working pressures up to 5500 psi. For all power and process applications it means that the advantages of compact, easy-to-install expansion control may be used at pressures far beyond those which had previously been considered safe.

Standard FLEXONIFLEX units have bellows type stainless steel pressure carriers, single or multiple ply, lined or unlined with integral control rings and end sections. Sizes range from 5/8" through 6" I.D., although larger sizes can be furnished. Suitable for temperatures from sub-zero to 1600° F. (higher with special materials).

For specific recommendations send complete details of your application.

OTHER CMH EXPANSION JOINTS

For low and medium pressure service you may take advantage of the same engineering skill that has developed FLEXONIFLEX units. CMH Controlled-Flexing Expansion Joints are available in copper or stainless steel for pressures up to 300 psi, sizes to 48" I.D. CMH Free-Flexing Expansion Joints are also available in copper or stainless steel for pressures up to 30 psi. sizes to 48" I.D. Larger sizes are available in both types for special applications.

Flexon identifies CMH products that have served industry for over 49 years.

CHICAGO METAL HOSE Corporation

1345 S. Third Ave. • Maywood, Ill. • Plants at Maywood, Elgin, Rock Falls, and Savanna, Ill.
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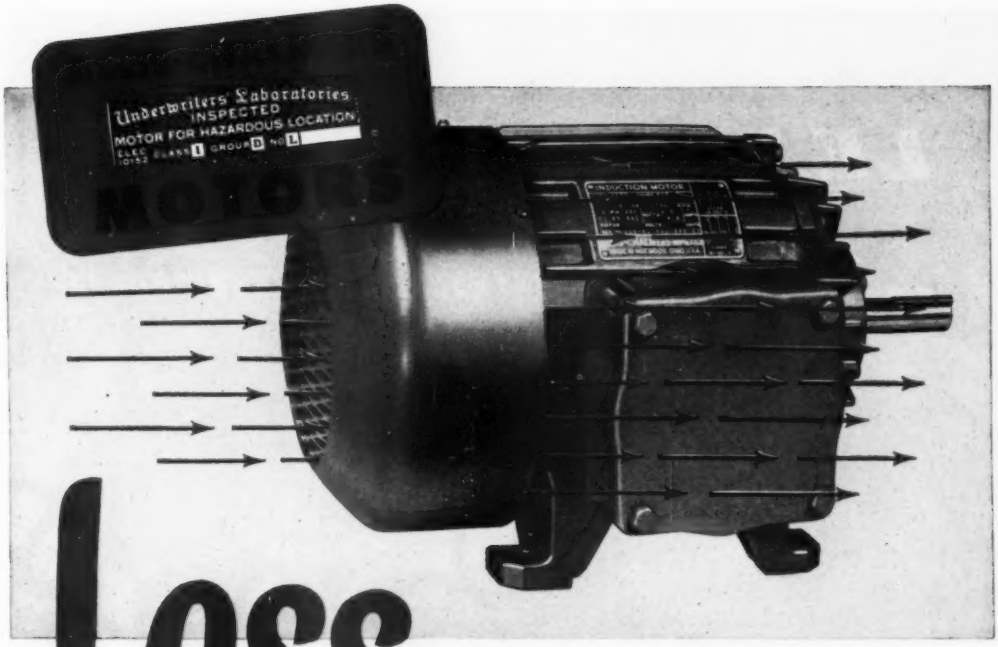
CMH

ONE DEPENDABLE SOURCE
for every flexible metal hose requirement

Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems
Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components



Less MOTOR CLEANING ...INSPECTION...OVERHAUL!

HERE'S A MOTOR that actually blows itself clean! Dirt is carried away by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers explosion-proof motor.

Dirt can't build up to cause overheating. Concealed air passages and pockets have been eliminated. Even oily dirt that sticks can simply be wiped or blown off.

And this means savings! Lower maintenance costs than ever before on the new Allis-Chalmers Type APZZ explosion proof motor.

Rigid Construction

The frame is cast iron which has high resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZZ explosion proof motor is built in all NEMA standard frame sizes from 224* to 505. Also in totally-enclosed, fan-cooled type. Your A-C Distributor or Sales Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7286.

A-3473

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

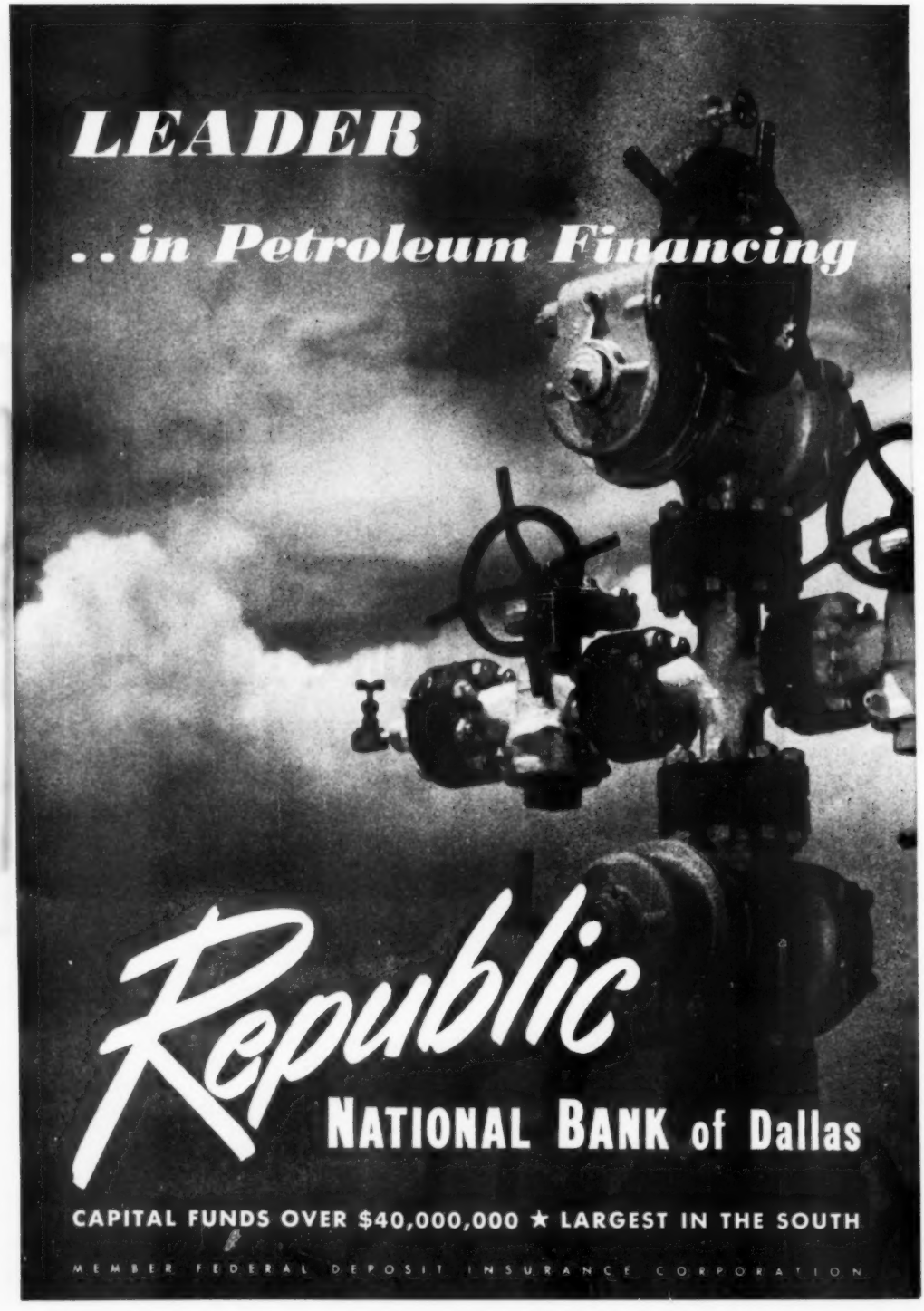
TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APKK also available in frames 203 to 224 inclusive.


LEADER
..in Petroleum Financing
Republic
NATIONAL BANK of Dallas
CAPITAL FUNDS OVER $40,000,000 ★ LARGEST IN THE SOUTH
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Attention!

OPERATORS OF CONDENSERS

Instead of retubing with plain tube, install finned tube. We mean Wolverine Trufin* —the integral finned tube—which will give you many times the surface area of plain tube in the same length; thus greatly increasing your capacity without increasing space. You'll gain extra production and improve your efficiency. Vital considerations today.

Moreover, the surface area thus obtained through the use of Trufin affects further economies in producing most petroleum condensates.

Since the fins of Trufin are extruded from the outside wall of a plain tube—hence a part of the tube itself—this unique tube will withstand vibration and sudden temperature changes.

And quite important, too, is the fact that retubing and "shut down" time is reduced appreciably.

Add all these advantages that Trufin offers you—space saving, capacity increase, production gain, improved operating efficiency, lowered maintenance cost, less "shut down" time, and many more—you can recognize the wisdom of specifying Wolverine Trufin for your next retubing job.

Conserve metal, men, and machines.

WOLVERINE TUBE DIVISION, Calumet and Hecla Consolidated Copper Company, Incorporated, *Manufacturers of seamless, non-ferrous tubing,* 1459 Central Avenue, Detroit 9, Michigan.

*Reg. U.S. Pat. Off.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ont.

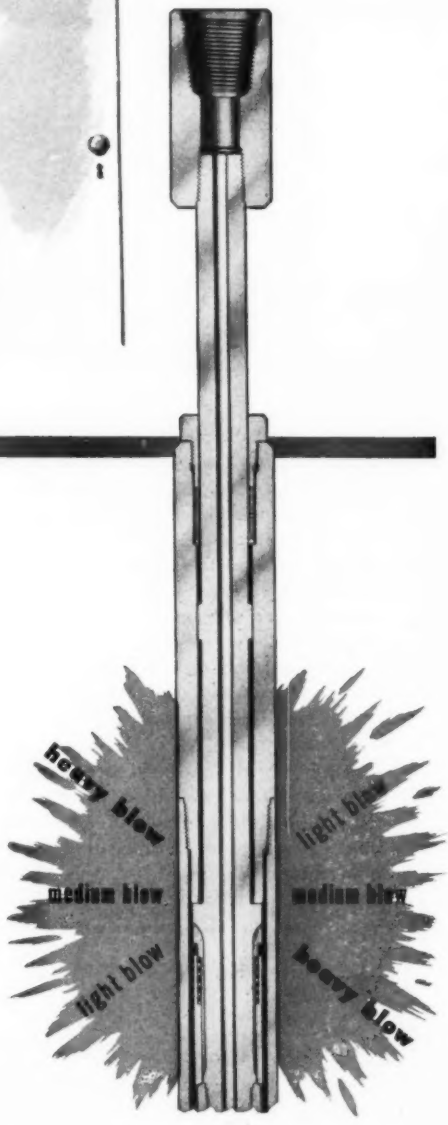
Wolverine Condenser Tubes stocked by Butler Industries, Inc., 355 South Fourth Street, Beaumont, Texas. Tel.: Beaumont 5-2351.

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
Sales Offices in Principal Cities

Export Department, 13 E. 40th St., New York 16, N. Y.

The right jar for the job at hand

Jarring Jerry



THE JOHNSTON-SUTLIFF HYDRAULIC JAR

A Jar that hits any desired blow, at any time, to meet any condition—without pulling out of the hole.

Write For Descriptive Literature!

JOHNSTON

SHOOT-TEST

M. O. JOHNSTON OIL FIELD SERVICE CORPORATION
3035 Andrita Street — Los Angeles 65, California
"Servicing California & Rocky Mountains"

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"Exclusive Export Sales"

Top results are insured through the uniform quality of Davison synthetic fluid-type cracking catalysts. Years of experience and research make it possible for Davison to better control physical characteristics and maintain chemical purity of their catalysts. Your requirements can now be supplied in either microspheroidal (M-S*) or ground (DA-1*) form . . . both available in various average particle sizes.

The Davison "D" also stands for dependability. Likewise, you can depend on Davison facilities for the development and production of catalysts for your specific processes.

*T.M.T.D.C.C.

Progress Through Chemistry

THE DAVISON CHEMICAL CORPORATION

Baltimore 3, Maryland

PRODUCERS OF: CATALYSTS, INORGANIC ACIDS, PHOSPHATES, PHOSPHATE ROCK, SILICA GELS, SILICOFLUORIDES AND FERTILIZERS

Goes Through When Others Can't!

The 4-Wheel-Drive Willys Station Wagon, powered by the high-compression *Hurricane* Engine, assures year-around transportation over all kinds of roads. It climbs a 66 per cent grade and goes through mud, sand, snow and roadless country that stops other cars. There is room for six passengers, plus luggage, tools or equipment. The rear seats easily lift out to provide 98 cu. ft. of cargo space. See your Willys dealer for a demonstration of this remarkable car.

4-WHEEL-DRIVE WILLYS STATION WAGON

WHERE WILL THEY ATTACK IN YOUR PLANT?

MACHINERY STORED OUTDOORS
Problem Corrosion
Answer Insul-Mastic Vinyl System

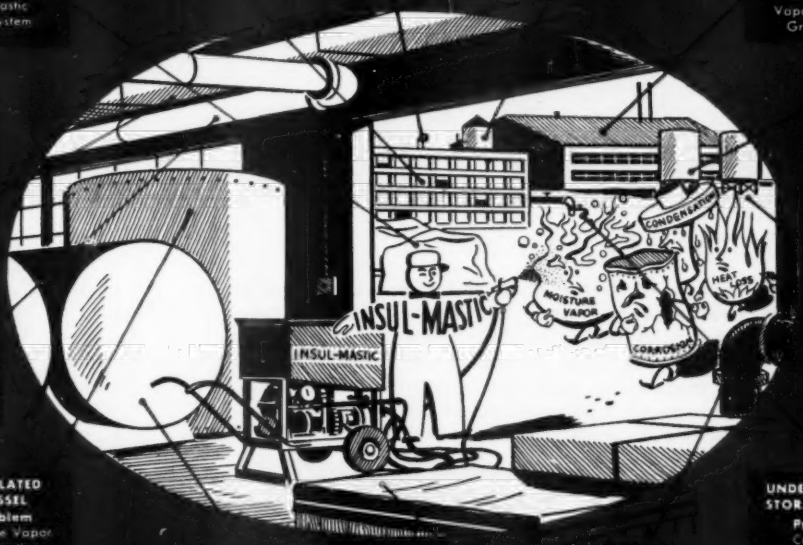
LEAKING WALLS
Problem Moisture
Answer Insul-Mastic Vaporseal & Granules

CORROSIVE VAPOR OUTLET
Problem Corrosion
Answer Insul-Mastic Vaporseal

WATER TANK
Problem Corrosion
Answer Outside—Insul-Mastic Vaporseal
Inside—Insul-Mastic Vinyl

LEAKING ROOF
Problem Moisture
Answer Insul-Mastic Vaporseal & Granules

WARM AIR DUCT
Problem Heat Loss
Answer Insul-Mastic Type "D"



MODERATE TEMPERATURE STORAGE TANK
Problem Heat Loss and Corrosion
Answer Insul-Mastic Type "D"

INSULATED PIPE
Problem Moisture Vapor Penetration
Answer Insul-Mastic Vaporseal

STRUCTURAL STEEL
Problem Corrosion
Answer Insul-Mastic Vaporseal

INSULATED VESSEL
Problem Moisture Vapor Penetration
Answer Insul-Mastic Vaporseal

ACID TANK
Problem Corrosion
Answer Insul-Mastic Vaporseal

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Problem Moisture and Salt Air
Answer Insul-Mastic Packaging Glues

COLD WATER INTAKE PIPE FOR BOILERS
Problem Condensation
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UNDERGROUND STORAGE TANK
Problem Corrosion
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You can't select a heavy coating of better quality than Insul-Mastic. Its ingredients were specially chosen for their stubborn resistance to acids, alkalis, weather and wear. Insul-Mastic is homogenized for smooth spraying without blobs or pinholes. *Write today for our catalog.*

think first of the coatings that last!

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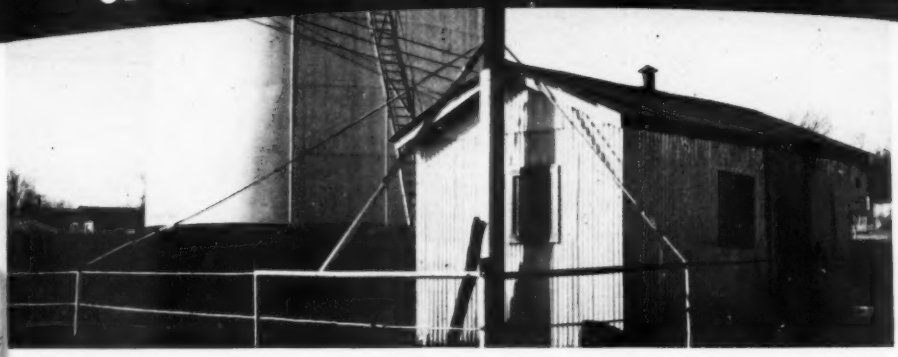
INSULATION

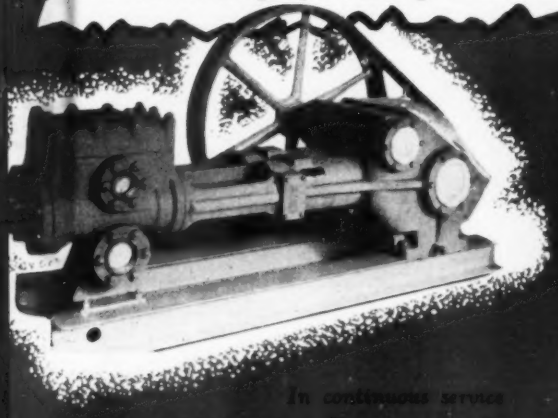
The Inside Story
OF AN AMAZING SERVICE RECORD



Faithful Automatic Pumping Station

from "OIL & GAS JOURNAL"

This pumping station of Deep Rock Oil Corp. near Drumright, Okla., has completed its twenty-second year of service. The installation utilizes the first automatic pumping units in Oklahoma, and works by maintaining a proper level of oil in the tank in the background. During the 22 years of operation, a little more than $500 has been spent in repairs, and the station now keeps an average of 3,000 bbl. of crude moving daily from Drumright field to the company's Cushing, Okla., refinery.



In continuous service since 1925, this Gaso Pump, electrically powered, is still delivering its full quota of dependable performance.

pumps of pipe line men. May we send you a copy of our latest catalog?

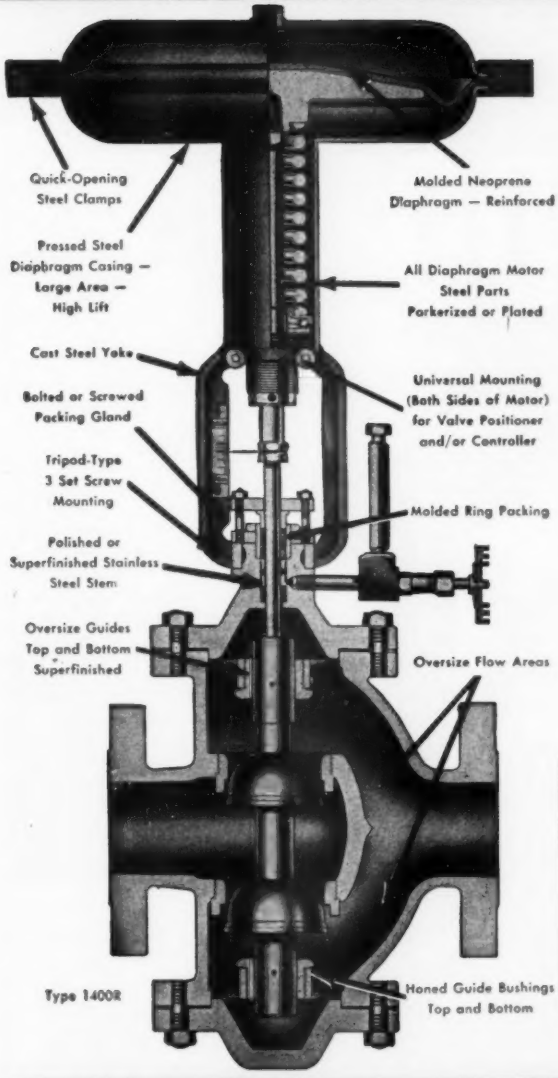
GASO PUMP & BURNER MFG. CO.

902 EAST FIRST ST., TULSA, OKLA.

GASO PUMPS

for every oil industry need

ADVANCED-TYPE VALVE FOR EXACTING CONTROL


Quick-Opening Steel Clamps
Pressed Steel Diaphragm Casing — Large Area — High Lift
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Bolted or Screwed Packing Gland
Tripod-Type 3 Set Screw Mounting
Polished or Superfinished Stainless Steel Stem
Oversize Guides Top and Bottom Superfinished
Type 1400R
Molded Neoprene Diaphragm — Reinforced
All Diaphragm Motor Steel Parts Parkerized or Plated
Universal Mounting (Both Sides of Motor) for Valve Positioner and/or Controller
Molded Ring Packing
Oversize Flow Areas
Honed Guide Bushings Top and Bottom

K & M Diaphragm Control Valves embody the accessibility and other desirable features of the "open yoke", formerly available only in cast iron construction, together with the strength and resistance to shock found only in steel.

The diaphragm casing assembly is the exclusive K & M Boltless Duoseal design which allows quick disassembly. The large diaphragm is molded so there is full effective contact with the diaphragm button during the complete valve stroke. This construction, together with heavy, calibrated, long-travel springs gives an unusually high power factor for extremely precise control.

Flow passages of the valve body have a minimum average area of 140% of comparable size pipe area; inner valve open free areas average 80% of pipe area. This design permits pressure drop to take place principally through the inner valve, assuring complete control over the full valve stroke.

Send for K & M Bulletin S10 for details and data.

K&M SERIES 1200 and 1400

Available sizes — ½ to 16 inches.

Construction — Cast iron, carbon and stainless steels and most machineable alloys.

Inner Valves — A wide range of styles and characteristics to meet varying requirements.

Action — Designed for direct or reverse action.

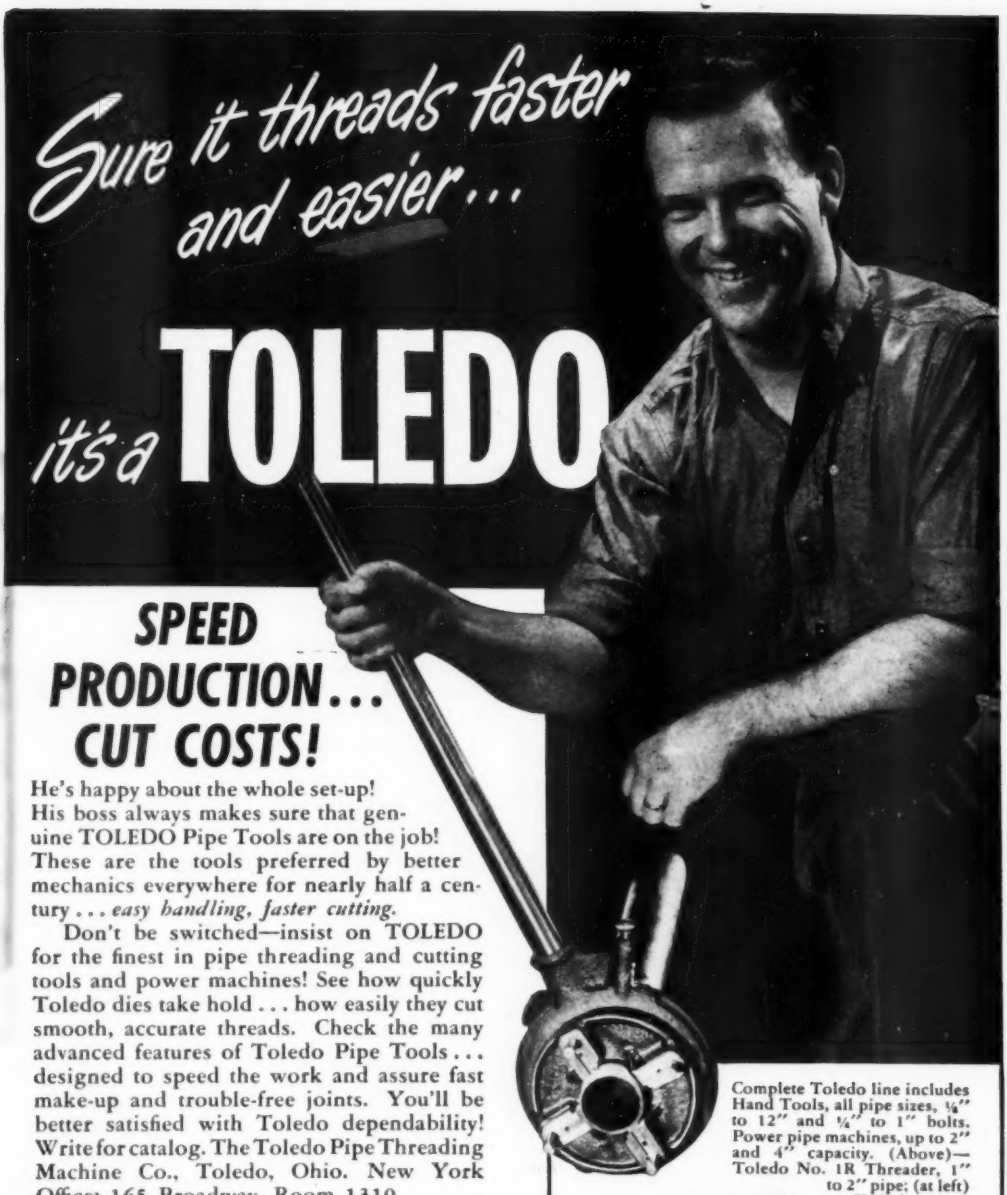
KIELEY & MUELLER

Established 1879

2027 - 43rd STREET NORTH BERGEN, N. J.

Sure it threads faster and easier...

it's a TOLEDO



SPEED PRODUCTION... CUT COSTS!

He's happy about the whole set-up! His boss always makes sure that genuine TOLEDO Pipe Tools are on the job! These are the tools preferred by better mechanics everywhere for nearly half a century . . . *easy handling, faster cutting.*

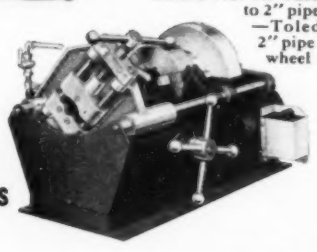
Don't be switched—insist on TOLEDO for the finest in pipe threading and cutting tools and power machines! See how quickly Toledo dies take hold . . . how easily they cut smooth, accurate threads. Check the many advanced features of Toledo Pipe Tools . . . designed to speed the work and assure fast make-up and trouble-free joints. You'll be better satisfied with Toledo dependability! Write for catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

RELY ON THE LEADER

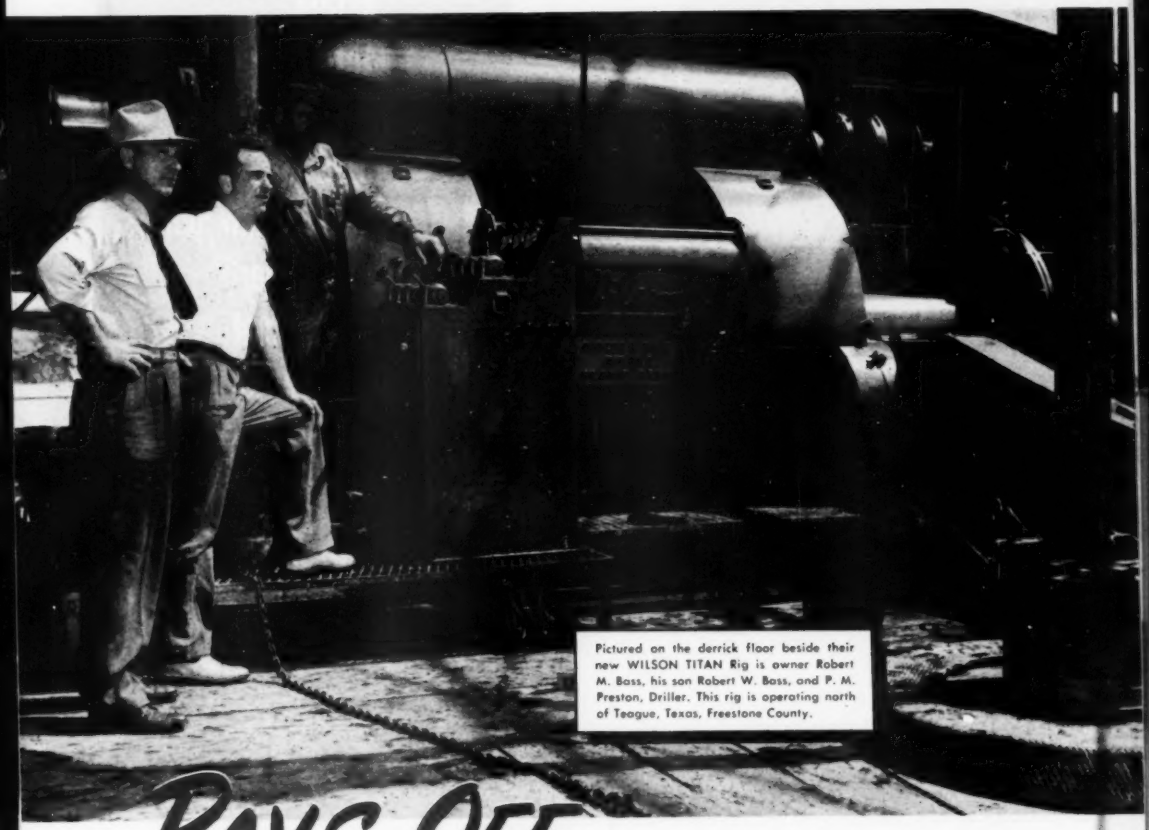
TOLEDO

PIPE TOOLS . . . POWER PIPE MACHINES . . . POWER DRIVES

Complete Toledo line includes Hand Tools, all pipe sizes, ⅛" to 12" and ¼" to 1" bolts. Power pipe machines, up to 2" and 4" capacity. (Above)—Toledo No. 1R Threader, 1" to 2" pipe; (at left)—Toledo #999 2" pipe machine, wheel or knife cut-off.



"Wilson ADVANCED ENGINEERING...

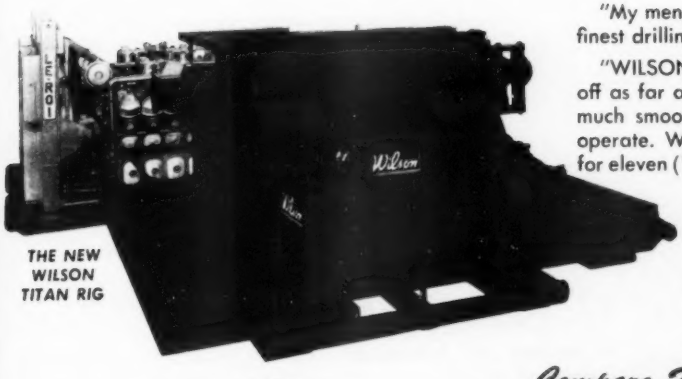


Pictured on the derrick floor beside their new WILSON TITAN Rig is owner Robert M. Bass, his son Robert W. Bass, and P. M. Preston, Driller. This rig is operating north of Teague, Texas, Freestone County.

PAYS OFF . . . for ROBERT M. BASS

Oil Well Drilling • Oil Well Servicing

KILGORE, TEXAS



THE NEW WILSON TITAN RIG

"My men say our new WILSON TITAN Rig is the finest drilling rig they have ever operated.

"WILSON ADVANCED ENGINEERING has paid off as far as we are concerned because this rig is much smoother running and more economical to operate. We have been operating WILSON Rigs for eleven (11) years and we feel they can't be beat.

"At the present time we are operating twenty-seven (27) WILSON units of various sizes and they are all giving us the most dependable service with a minimum of downtime for repairs."

Compare Quality - Compare Prices

Wilson **MANUFACTURING CO., Inc.**

WICHITA FALLS, TEXAS

ALCOA Activated* Alumina dries to lower dew points than other commercial adsorbents

ALCOA *Activated* Aluminas are among the most effective and efficient desiccants available for the dehydration of liquids and gases. Dew points as low as *minus* 100° F.—and even lower—may be obtained, and under normal circumstances, ALCOA *Activated* Aluminas can be used for an almost indefinite number of drying cycles.

ALCOA *Activated* Aluminas have high resistance to crushing, shock and abrasion . . . do not soften, swell or disintegrate, even when immersed in water . . . are non-toxic . . . non-corrosive . . . high in purity . . . practically iron free.

Besides their use for dehydration, ALCOA *Activated* Aluminas adsorb certain gases and vapors from gaseous mixtures and serve as catalysts and catalyst carriers. They are used in the liquefaction of gases, and for the maintenance of transformer and lubricating oils.

Let us tell you more about these efficient, solid-type desiccants. Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 618J Gulf Building, Pittsburgh 19, Pa.

**Reg. T. M., Aluminum Company of America*

Alcoa Chemicals

ALCOA

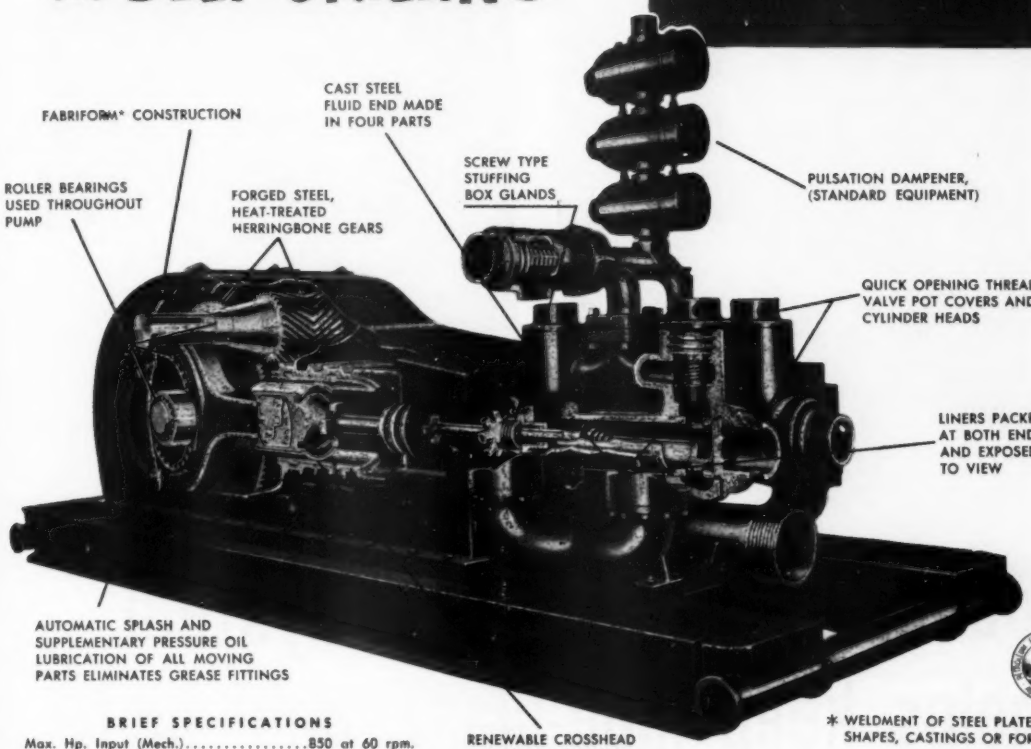
ALUMINAS and FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • HYDRATED ALUMINAS • TABULAR ALUMINAS • LOW SODA ALUMINAS ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE • GALLIUM

Here's a Mud Pump that is Designed and Built for

JET BIT, BIG HOLE and DEEP DRILLING

The Emsco D-850 Duplex Power Mud Pump provides range of pump pressures and mud volumes heretofore unobtainable!


FABRIFORM* CONSTRUCTION
CAST STEEL FLUID END MADE IN FOUR PARTS
SCREW TYPE STUFFING BOX GLANDS
PULSATION DAMPENER, (STANDARD EQUIPMENT)
ROLLER BEARINGS USED THROUGHOUT PUMP
FORGED STEEL, HEAT-TREATED HERRINGBONE GEARS
QUICK OPENING THREADED VALVE POT COVERS AND CYLINDER HEADS
LINERS PACKED AT BOTH ENDS AND EXPOSED TO VIEW
AUTOMATIC SPLASH AND SUPPLEMENTARY PRESSURE OIL LUBRICATION OF ALL MOVING PARTS ELIMINATES GREASE FITTINGS
RENEWABLE CROSSHEAD GUIDES AND SLIPPERS

* WELDMENT OF STEEL PLATES, SHAPES, CASTINGS OR FORGINGS

BRIEF SPECIFICATIONS

Max. Hp. Input (Mech.)	850 at 60 rpm.
Max. Size Liners	8¼"
Stroke	18"
Vol. W/Max. Size Liners	933 gpm.
Press. W/Max. Size Liners	8¼" — 1328 psi.
Press. W/Min. Size Liners	6" — 2680 psi.
Weight	45,000 lbs.

EMSCO D-8

EMSCO DERRICK & EQUIPMENT COMPANY
LOS ANGELES, CALIFORNIA

Houston, Texas — Garland, Texas

Distributors: Bovaird Supply Company, Tulsa, Oklahoma. Mid-Continent Supply Company, Fort Worth, Texas. Oil Equipment, Ltd., Calgary, Alberta. *Export Distributor*: Mid-Continent Supply Co., Inc., 42 Broadway, New York 4, N. Y.

H-111 — July, 1951

The specialized mud circulation requirements of jet bit, big hole and deep drilling are fully met by the new Emsco D-850. With this pump, it is no longer necessary to series-operate or compound pumps to get the needed pressures and volumes.

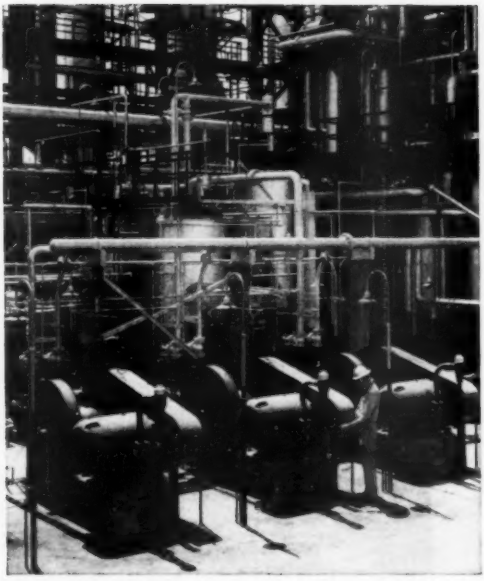
In addition, the D-850 *weighs no more and costs no more* than pumps of much lower horsepower! If your horsepower requirements fall between 650 and 850, you'll be dollars ahead with the D-850. You get reserve horsepower without paying a premium price.

No masterminding is needed to rig up, operate and maintain an Emsco D-850 Mud Pump. It's virtually foolproof. There are no adjustments to be made . . . no greasing to be done . . . lubrication is completely automatic! The liners are exposed to view, making it easy to detect and correct leakage.

If you are contemplating jet bit, big hole or deep drilling, look into the performance and economy of the Emsco D-850!

A PHOTO-REPORT ON MODERN

1 **ONE FEATURE** of the Oleum refinery is its Duo-Sol extraction unit, used in the manufacture of lubricants. Pumps used in this process are driven by these G-E 2300-volt and 220/440-volt totally enclosed vertical motors rated from 20 hp. to 125 hp. Capacity of the unit is 6000 barrels per day.



2 **COMPRESSOR UNITS** in the Duo-Sol process section are driven by these three G-E 100-hp 2300-volt motors. Because of their corrosion-resistant totally enclosed fan-cooled construction, they are well suited to refinery conditions, regardless of the type of acids, alkalis or solvents encountered.

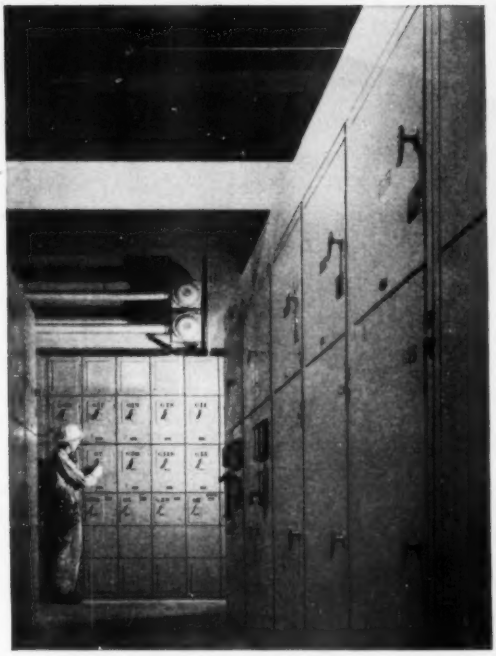
Co-ordinated electrical system helps keep lube-plant yield high!

Engineered G-E drives and power distribution equipment assure needed reliability at Union Oil Company's refinery in Oleum, California.

From 75,000 barrels per day of crude, Union Oil's Oleum refinery processes all types of lubricating oils, plus gasoline, diesel oil, greases, refined wax, and other products. To maintain this diversified output, General Electric power-distribution and drive equipment provides the dependable electric power needed. Co-ordinated from start to finish, this installation is further proof that General Electric can meet all *your* refinery's electrical needs. Ask your G-E representative to give you the facts. General Electric Co., Schenectady 5, N. Y.

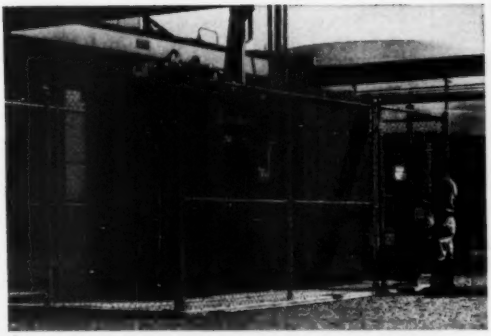
GENERAL ELECTRIC

661-27

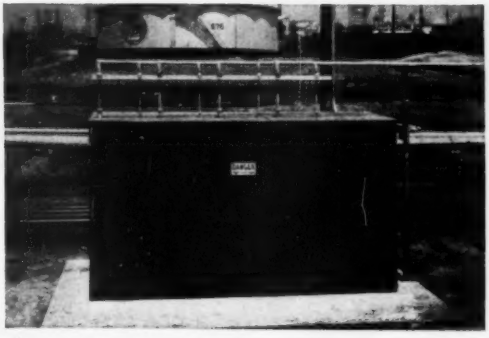


3 PROCESS CONTROL for the Duo-Sol extraction unit is centralized in this pressurized and vapor-proof building to permit the use of standard non-explosion-proof equipment. Shown here are G-E limitamp motor-starters rated up to 350 hp and a Trumbull switchboard for controlling small motors.

4 PROTECTION against complete plant shutdown is part of the job for this incoming line G-E metal-clad switchgear assembly with dual feeders.



5 FOR LOW-VOLTAGE NEEDS, this G-E outdoor-type 500-kva load-center substation steps down 2400-volt power to 480 volts close to where it's needed, cutting voltage drop and power losses. Complete and co-ordinated, these G-E metal-enclosed units are factory-built for quick installation.



6 CONTROL OF HIGH-VOLTAGE MOTOR and short circuit protection are both provided by this G-E outdoor-type limitamp assembly, serving a transfer pump house. Current-limiting fuses in limitamp controllers cut off current fast when a short occurs, protecting equipment against extensive damage.

Co-ordinated
ELECTRIC EQUIPMENT
for lubricating-oil and solvent extraction

LOOK FOR THE GREEN RODS...

POINT NO. 1 EVERY JONES SUCKER ROD... is descaled and shot peened for added fatigue strength. A more corrosion-resistant and paint-adhering surface is also produced.

JONES

SUCKER RODS

Best in the Field!

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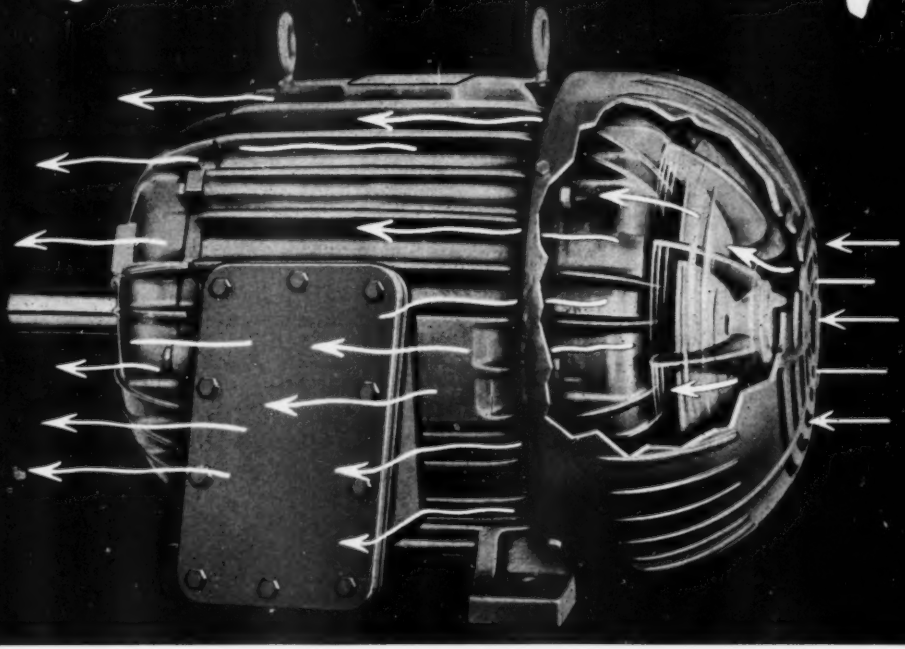
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

STAYS Cool-STAYS Clean-STAYS Safe!



THE ELLIOTT CROCKER-WHEELER

EXPLOSION-PROOF Sealedpower MOTOR

Approved-

Underwriters Laboratories, Inc.
INSPECTED
ELECTRIC MOTOR FOR HAZARDOUS LOCATION
CLASS ■ GROUP ■ No ■

CLASS I - GROUP D
CLASS II - GROUP F
CLASS III - GROUP G

■ TEN YEARS AGO the C-W "Sealedpower" motor, with its unique cooling and self-cleaning system, made its bow to American industry. Its immediate and continued popularity has put thousands into successful and satisfactory service.

Now designed with approved explosion-proof enclosure, adding that advantage to the exceptional coolness and cleanliness due to the fan-driven air blast directed along the radial fins, that sweeps away heat, and will not allow dirt or dust to settle.

Here is the ideal motor for refinery and natural gasoline plant drives. Write for the Explosion-proof Sealedpower Bulletin.

1901 HALF CENTURY OF POWER PROGRESS 1951

ELLIOTT COMPANY • *Crocker-Wheeler Division*
AMPERE, NEW JERSEY
PLANTS AT: JEANNETTE, PA. • RIDGWAY, PA.
AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
Branch Offices and Representatives in Principal Cities
ELLIOTT *Approved* SERVICE SHOPS Cover the Country

CW-38

You're a step ahead with **ELLIOTT**

Probolog

gives accurate picture of heat exchanger tube condition . . .

Without removing tubes!

TODAY'S NEEDS place a high value on reliable tools and methods of failure-prevention. The Shell-developed Probolog is an outstanding example of such a tool.

Probolog, with speed and precision, gives you a *permanent record* of the condition of individual tubes in heat exchangers and other tube-nest equipment. This record instantly spots worn, eroded, or pitted sections of a tube.

Probolog is a one-man unit . . . simple, fast and dependable in its "judgment." It has an established record for unfailing accuracy, and for reducing maintenance costs in the inspection of non-magnetic tubular equipment.

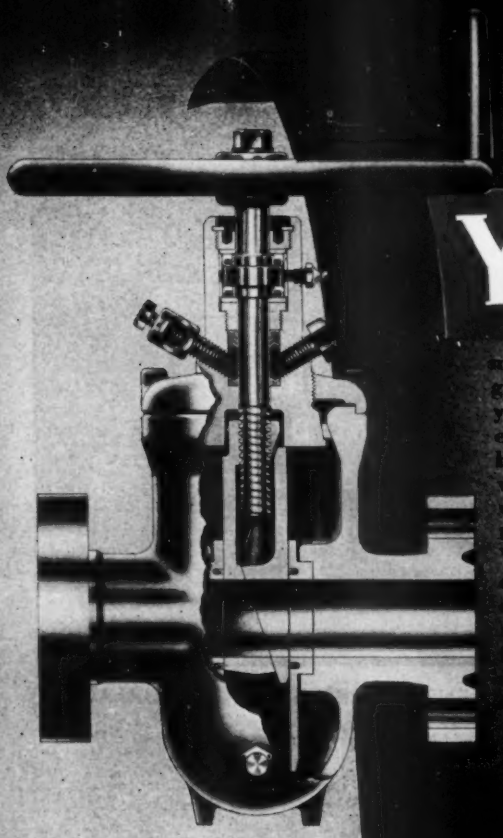
Additional information on the Probolog will be sent upon receipt of your letterhead request.

SHELL DEVELOPMENT COMPANY

50 WEST 50TH STREET • NEW YORK 20, N. Y.

SHELL

You Made W-K-M Valves Best in the Industry . . .



Y

U, the user, dictated the design of W-K-M Valves to meet your specific needs. You suggested design refinements from your extensive operating experience. Since the beginning you have been the key man in the development of these superior valves. These are the reasons why the quality and performance of W-K-M Valves fit so perfectly every requirement of the oil industry, and why they are recognized as the leading valves in their field. It makes good business sense to specify W-K-M for every application.

W-K-M Company

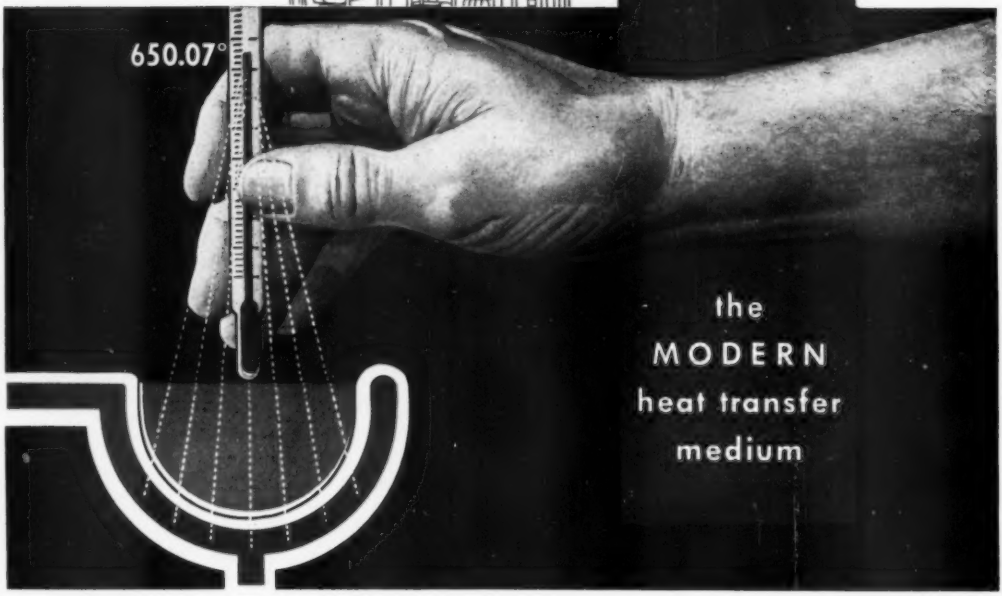
OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

HOUSTON, TEXAS, U. S. A.
LOS ANGELES

Cable Address: "WILKOMAC"
Export Office: 30 Rockefeller Plaza, New York, N. Y.

the heat is on right . . .

DOWTHERM



the
MODERN
heat transfer
medium

MAINTAINS UNIFORM HEATING OVER ENTIRE PROCESSING SURFACE

Here's the best answer to the precise temperature control required in petroleum fractionation—DOWTHERM®. This material, a stable organic heat transfer medium, is used in a closed system in the same manner as steam but it offers *low pressures* at temperatures from 300°F. to 750°F. Thus, in this temperature range, carefully controlled and uniform heating is available, hot spots and overheating will be eliminated and the coking problem diminished.

Several pieces of equipment can be held at different constant temperatures by one DOWTHERM system, or if alternate heating and cooling are required—DOWTHERM also should be considered in your system.

If you need constant high temperatures at low pressures write Dow for complete DOWTHERM information.

ATTENTION PROCESS MEN . . . Use DOWTHERM . . . for heating and reboiling naphthas, kerosene, gas and oil, and for the production of special products . . . also for recovery systems of solvent refining units.

THE DOW CHEMICAL COMPANY
Midland, Michigan

The Dow Chemical Company, Dept. DO-18
Midland, Michigan

"Tell Me More About DOWTHERM"

Name _____ Title _____

Company _____

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DOW

Igloo or Jet Engine...

Wherever temperatures are important to you, there's a dependable American Thermometer or Temperature Measuring Instrument for the purpose. The line is so complete, selection for specific needs is easy, whether you require accurate temperature measuring instruments to safeguard product quality, protect equipment or control costs.

American Thermometers and Temperature Indicators and Recorders are available in ranges from minus 100°F. to plus 3000°F., with *actuation by mercury, vapor pressure, gas, bi-metal or thermocouple* —depending on instrument type and requirements. And, to indicate or record temperatures accurately as far as 250 feet from the temperature source, famous "Magic Pulse" self-compensating capillary tubing can be supplied.

Whether you must know the exact temperature of a kiln, processing vat, deep freeze – anything hot or cold – choose from the many fine American Thermometers and Temperature Measuring Instruments. New catalog gives complete details.

Stocked and Sold By Leading Distributors

AMERICAN RECORDING THERMOMETERS

Single, double, or triple pens in round or rectangular cases. 10-inch chart with effective scale width of 3⅝" for easy, accurate reading. Chart Drive: 24-hour spring wound or electric. Actuation: mercury, vapor pressure, or gas. Ranges from minus 60°F. to plus 1000°F.

AMERICAN TEMPERATURE INDICATORS

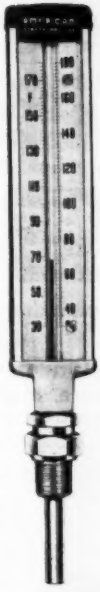
A radically new pyrometric-type instrument. Combines the unique Microsen Balance with the sensitivity of thermocouple measurement. Extremely accurate, rugged, dependable. Power actuated pointer. Ranges from minus 100°F. to plus 3000°F. American Temperature Recorder also available.

AMERICAN DIAL THERMOMETERS

Clear, bold figures on exactly graduated dials; pointer of contrasting color. Actuation: mercury, vapor pressure, gas, or bi-metal. Ranges from minus 60°F. to plus 1000°F. Cases for stem, wall, or flush mounting.

AMERICAN INDUSTRIAL GLASS THERMOMETERS

Full scale opening of 7", 9", or 12" with easy-to-read red mercury tubing. Ranges from minus 80°F. to plus 1150°F. Straight and angle forms.



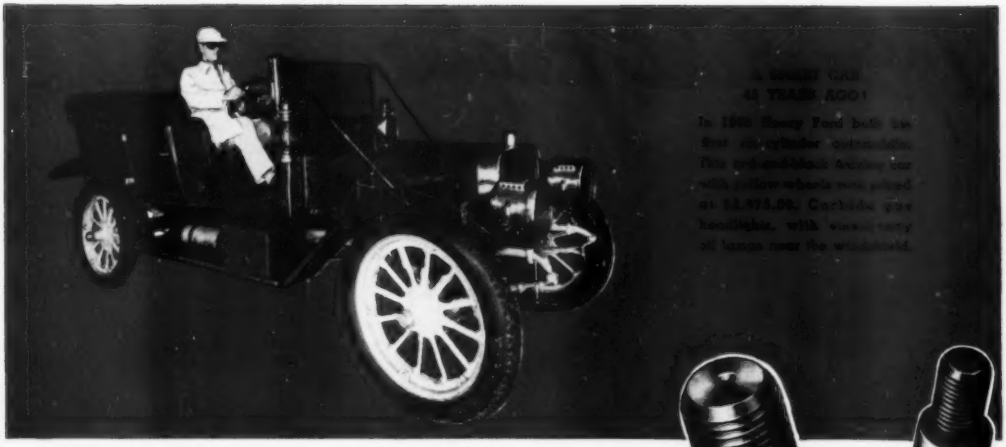
1850 AMERICAN U S A

AMERICAN INDUSTRIAL INSTRUMENTS

MANNING MAXWELL & MOORE M&M TRADE MARK

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' ELECTRICAL AND INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



HORSE AND BUGGY DAYS ARE GONE FOREVER...

Forty-five years ago any man who drove a car expected trouble... and got it. But, if he happened to produce oil wells, he had trouble with his sucker rods and bottom hole pumps, too.

Horse and buggy days are gone forever. Cars are tough — and so are pumps and sucker rods, thanks to AXELSON.

In 1906 a set of tires was good for two or three thousand troublesome miles. Now you expect up to fifty thousand miles without a flat. Axelson has improved the performance of sucker rods in about that same ratio. As to Axelson bottom hole pumps — today you just don't wear 'em out. When wear occurs, you have them overhauled in one of our near-by pump repair shops and pick them up as good as new.

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

For 1951 performance — buy AXELSON. The service you get at your near-by Jones & Laughlin Supply store will be a pleasure, too.

"... here's My warehouse!"

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation

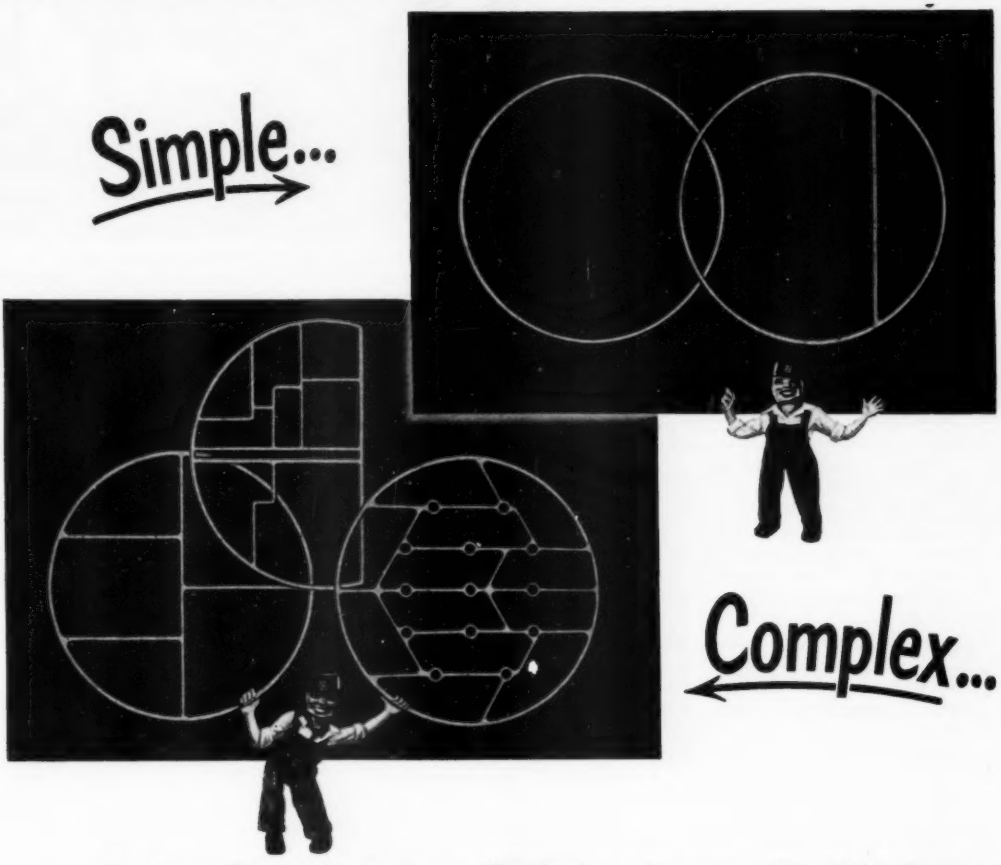
EXPORT: 405 Lexington Ave., New York, N. Y., U.S.A.

General Offices: TULSA, OKLA.

J&L STEEL

82 Stores • 17 Offices • 6 Resident Salesmen

Precision-made to the design you need . . .



Goetze Heat Exchanger Gaskets stay on the job longer!

Whether your specifications call for a simple or complex design, you can depend on Johns-Manville Goetze heat exchanger gaskets to do the kind of sealing job that costs you less in the long run!

That's because they are carefully hand-tailored to assure the accuracy of fit so important in heat exchanger service. Every detail of construction reflects the craftsmanship that goes into the fabrication of these better gaskets. You'll find no wrinkles or cracks on the corners. Lap widths are ample, rib widths uniform.

More than 60 years of gasket-making experience is your further assurance that when you put a Goetze heat exchanger gasket on the job, you can count on it to *stay* on the job for a long time. For further details and a prompt estimate of cost, send us a blueprint or template. Just address Johns-Manville, Box 290, New York 16, New York.

Johns-Manville Goetze GASKETS

THERE'S A JOHNS-MANVILLE PACKING AND GASKET FOR EVERY SERVICE

Pick The Make That Lets YOU Pick

exactly the design you need

Worthington has a centrifugal pump for practically any conceivable refinery requirement—in the most complete range of sizes.

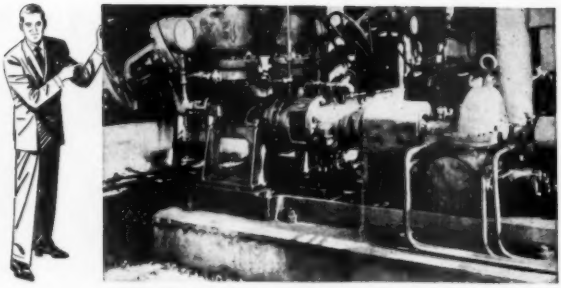
The pictures here show only a few of the many purposes served by Worthington Centrifugals. Whether your problem is high temperatures . . . volatile liquids . . . abrasives . . . acids . . . or any of the host of others that harass refineries — the Worthington line includes the one best pump for the job.

Further assurance you enjoy when you standardize on Worthington: you know that Worthington, making the broadest line of pumps, will recommend the best type for each job—you know you'll benefit from *engineering* that's the finest in the business—and you know you can depend on *service* that does its best to keep you in peak production.

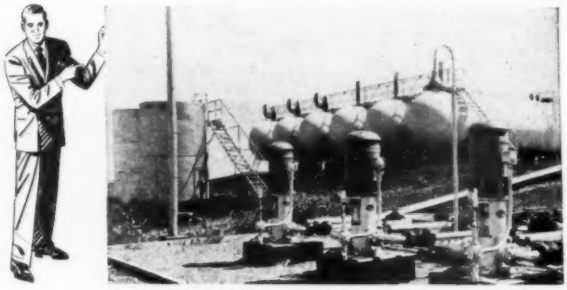
Write us for bulletins on the types in which you're interested and see why *there's more worth in Worthington*. Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.

SEE OUR CATALOG IN SWEET'S

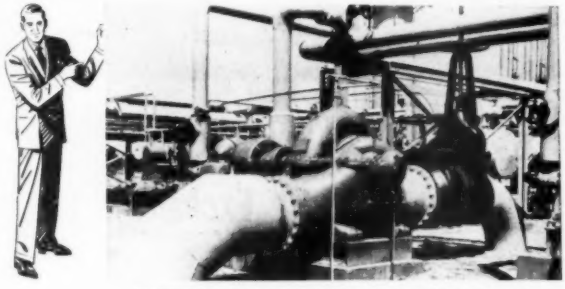
MEMBER



WORTHINGTON HR CENTRIFUGAL, shown at Sun Oil Co., Marcus Hook, Pa., is typical of pumps used in distillation, cracking and treating petroleum products.



WORTHINGTON QER VERTICAL centrifugal process pump, shown at Magnolia Petroleum Company, Chitwood, Oklahoma, is used to transfer propane, butane and LPG.



WORTHINGTON LA CENTRIFUGAL, turbine-driven, shown at Carthage Corporation plant, Carthage, Texas, is typical of cooling tower and general service pumps.

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

WORTHINGTON

C.1.4

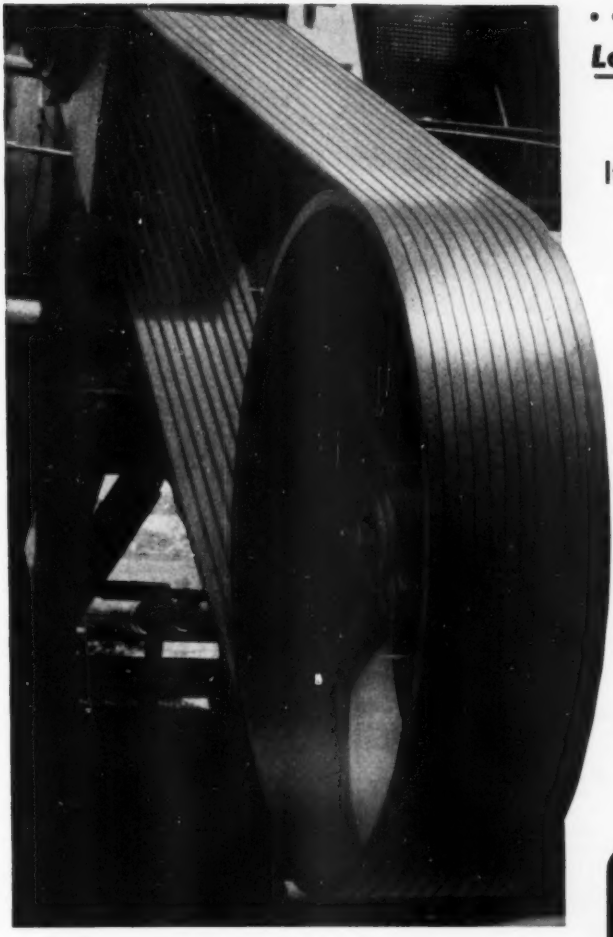
Types HR and HB Capacities to 1800 gpm. Heads to 900 ft. Temperatures from far below zero to 800 F. Pressures from high vacuum to 750 lb. gauge.

Type HD Hydraulically-balanced, double-suction impeller handles boiling liquids with low submergence. 600 to 3200 gpm. Heads to 700 ft, temperatures to 850 F, pressures to 550 lb.

Type CNE For loading or transfer service. Capacities to 1500 gpm. Heads to 500 ft.

Type HM Available in 12 sizes. Capacities to 700 gpm. Heads to 450 ft. Maximum temperatures 300 F.

WE CALL THEM "BULL DOGS" —you'll call them "WORKHORSES"



. . . these Tough Longer-Lasting V-Belts

It pays to put your money on the Bull Dog Horse . . . because . . .

1. Bull Dog Cord Section has superior load carrying capacity . . . ability to absorb shock.
2. Bull Dog Cord has less stretch.
3. Bull Dogs have tougher covers.
4. Bull Dog Cords will stand up under punishing flexing.

Consult your nearest Happy Company office on BWH Bull Dog V-Belts or write direct for complete information.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

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The HAPPY COMPANY
Formerly HAPPY BELTING COMPANY
TULSA OKLAHOMA

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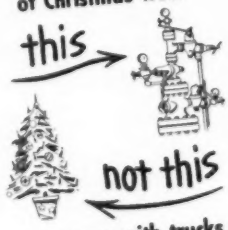
Wichita, Kan.
Ellinwood, Kan.

Industrial Hose Rubber Belting V-Belt Sheaves
V-Belts Power Transmission Equipment

To control oil flow, you need the right kind of Christmas tree.



Same way with trucks. Get one that fits the job!

Save with powerful DODGE TRUCKS... "Job-Rated" for dependability!

Let new Dodge "*Job-Rated*" trucks solve your on- or off-the-road hauling problems—and save you money in the bargain!

Under the hood you'll have plenty of eager "horses" for your toughest jobs. New Dodge truck engines pack up to 20% more power than ever before—yet they're extra easy on your billfold. Features like twin carburetion and exhaust system on big 145-hp., 3-ton jobs, for instance, boost engine efficiency and trim operating costs down to size!

But this is only part of the story. You'll like the way these husky haulers shoulder bigger loads . . . the way they wheel in and out of tight spots . . . the way they "walk" over rough terrain.

Best of all, you get year-in, year-out dependability. You just can't beat these great-hearted Dodge "*Job-Rated*" trucks for staying power!

Your Dodge dealer has all the facts. Better see him—soon!

"Job-Rated" TRUCKS DO THE MOST FOR YOU

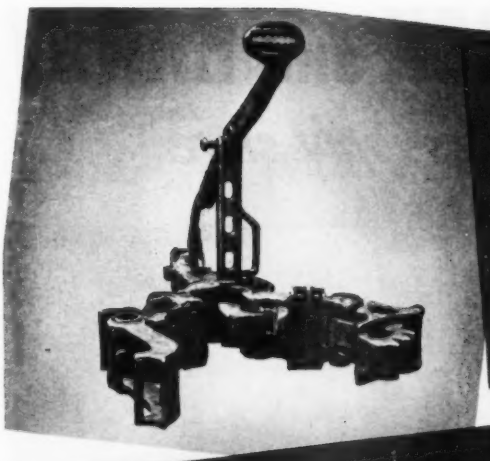
How Dodge Trucks are "*Job-Rated*" for Oil Field and Refinery hauling jobs!

A Dodge "*Job-Rated*" truck is engineered *at the factory* to fit a specific job . . . save you money . . . last longer.

Every unit from engine to rear axle is "*Job-Rated*"—factory-engineered to haul a specific load over the roads you travel and at the speeds you require.

Every unit that SUPPORTS the load—frame, axles, springs, wheels, tires, and others—is engineered right to provide the strength and capacity needed.

Every unit that MOVES the load—engine, clutch, transmission, propeller shaft, rear axle, and others—is engineered right to meet a particular operating condition.



BEAT UP TOOL... LOOKS ALL THROUGH...

BJ MAKES 'EM GOOD AS NEW!

BJ
FACTORY SERVICE
Engineered
OIL TOOL REBUILDING
for safety and long life

Here's how BJ Oil Tool Rebuilding Service makes field-worn tools like new:

DOUBLE CHECK MAGNAFLUX inspection *before* and *after* repairs detects any hidden cracks or flaws.

COMPLETE FACTORY OVERHAUL puts every part back in perfect shape!

MATCHED METAL and proper welding make sure that metal build-up is like new.

PRECISION MACHINING provides exact fit and original efficiency.

HEAT TREATMENT tones up metal – restores its original tensile strength and stamina.

ASK YOUR BJ REPRESENTATIVE OR YOUR JOBBER...

The men and machines that made 'em know 'em best!

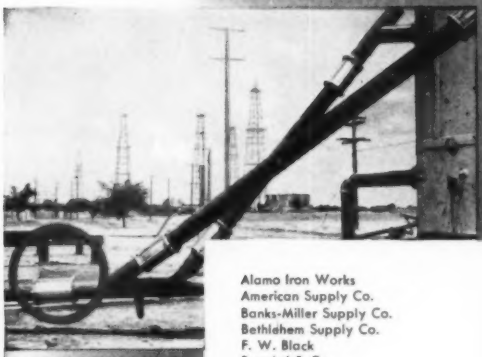
Byron Jackson Co.

PACIFIC COAST SERVICE — 3201 E. Vernon Ave., Los Angeles 58, Calif. — Jefferson 6171

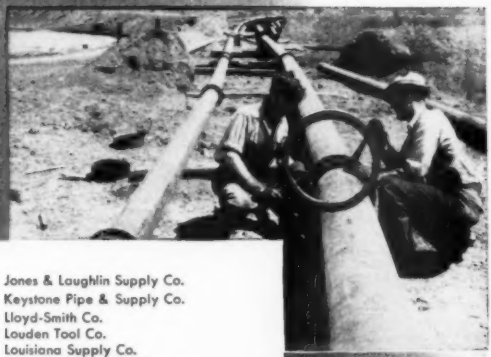
ROCKY MOUNTAIN SERVICE — Woodward 8525

DRESSERS...QUICK and HANDY

...at your favorite supply store



Well and tank connections made easy with Dresser Style 40 Long Sleeves. They're tight and flexible, even where pipe-ends don't meet.

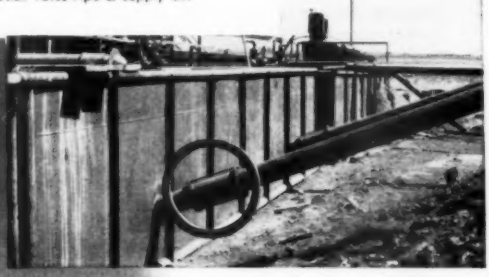


Drilling lines are laid quickly with Dressers, day or night regardless of weather. When coupled with Dressers, lines can be easily relocated when necessary.

Alamo Iron Works
American Supply Co.
Banks-Miller Supply Co.
Bethlehem Supply Co.
F. W. Black
Bovaird & Co.
Bovaird & Seyfang Mfg. Co.
The Bovaird Supply Co.
Bradford Supply Co.
Briggs-Weaver Machinery Co.
Brown-Strauss Corp.
The Cameron & Barkley Co.
Capital City Supply Co.
Cen-Tex Supply Co.
Clowe & Cowan, Inc.
Coastal Supply Co.
Continental Supply Co.
Cooper Supply Co.
C. W. Cotton Supply Co.
Crane Co.
Dunigan Tool & Supply Co., Inc.
Federal Oil Field Supply Co.
Franklin Supply Co.
Frick & Lindsay Company
General Oil Field Supply Co., Inc.
Grinnell Co.
Houston Oil Field Material Co., Inc.
Howard Supply Co.
Industrial Supply Co.
International Derrick & Equipment Co.
Iverson Supply Co.
Jarecki Manufacturing Co.
Jones & Laughlin Supply Co.
Keystone Pipe & Supply Co.
Lloyd-Smith Co.
Louden Tool Co.
Louisiana Supply Co.
The McJunkin Supply Co., Inc.
Mid-Continent Supply Co.
Midland Supply Co., Inc.
Momsen, Dunnegan & Ryan
Morrison Supply Co.
Mountain Iron & Supply Co.
Murray-Brooks Hardware Co., Ltd.
The National Supply Co.
Norvell-Wilder Supply Co.
Oil Well Supply Co.
Peden Iron & Steel Co.
The Peerless Supply Co., Inc.
Pelican Well Tool & Supply Co.
Producers Supply & Tool Co.
Republic Supply Co.
Republic Supply Co. of California
San Antonio Machine & Supply Co.
Spain Supply Co.
Standard Supply & Hardware Co., Inc.
Superior Iron Works & Supply Co., Inc.
United Supply & Mfg. Co.
Weaks Supply Co., Ltd.
Well Machinery & Supply Co., Inc.
Western Supply Co.
Wilson Supply Co.
Jack Yates Pipe & Supply Co.

Dresser Style 40 Long Sleeves spans the gap and gives a tight, vibration-proof joint on the "Christmas Tree" below. Factory-built Dressers are ideal for jobs like this ... and available everywhere.

10" Dresser Long Sleeves on rotary drilling rig mast base. Pipes are joined easily with Dressers, using only a wrench. Vibration stresses are absorbed. Lines stay flexible-tight.



DRESSER COUPLINGS and Repair Products

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California. Sales Offices: New York, Philadelphia, Chicago, Houston, South San Francisco. In Canada: 629 Adelaide St., W., Toronto.

100 temperatures recorded

by One

Speedomax recorder

ESSO

phenol extraction unit
Bayonne, N. J.

It would take six 16-point recorders—each with its own chart—to give the same information which is concentrated on the one chart of the 100-point Speedomax Recorder shown above. Reading one chart instead of six saves time—a busy man can check temperatures more often. The danger of mistakes resulting from a comparison of six separate charts is eliminated.

Minimized Cost Per Thermocouple Point

Instrument cost per point recorded is less than that for any other L&N recorder! Panel space is reduced by two-thirds. Scanning of 100 points during a heat balance check requires only six minutes, forty seconds. If, like Esso, you are interested in only 20 of the 100 temperatures as long as the process is operating smoothly, you can read them in only 80 seconds.

You need not provide for 100 thermocouples unless you need them, since instrument capacities range from 40 to 160 points. Four types of operation are always at hand:

1. **Continuous Indicating but no Recording.** All points are indicated in succession.
2. **Automatic START-STOP.** In this type of operation, a specified temperature limit is set. As long as no thermocouple point exceeds this limit, the Speedomax simply indicates. But if any point should exceed the limit, automatic recording of all points begins and an alarm is sounded to summon the operator. Thermocouple connections are grouped in banks of 20, and a different temperature limit can be set for each bank.
3. **Continuous Recording.** Automatic recording of all points.
4. **Selective Indicating or Recording.** Indicating or recording of any bank, combination of banks, or single point.

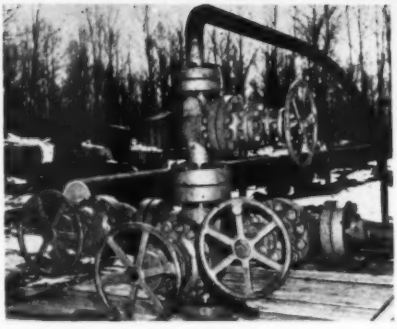
To get more facts, write our nearest office, or 4959 Stenton Ave., Phila. 44, Pa. Ask for Folder ND46-33A(1).

LEEDS & NORTHRUP

Jrl Ad ND46-33.702(3)

KEROTEST

FLOW LINE VALVES



Here's What Happened!

The above high pressure gas well in western Pennsylvania was equipped with a 10,000 p.s.i. test KEROTEST cross type master valve and matching Kerotest Flow Line Valves. The well was shot and cleaned through these valves and the well closed off at over 4000 pounds pressure without a leak. A water seal poured on the top valve showed not a bubble! This well is flowing 50,000,000 cu. ft. of gas daily with a back pressure of 2300 lbs. sq. in.

Here's why this KEROTEST Flow-Line Valve is justly famous—

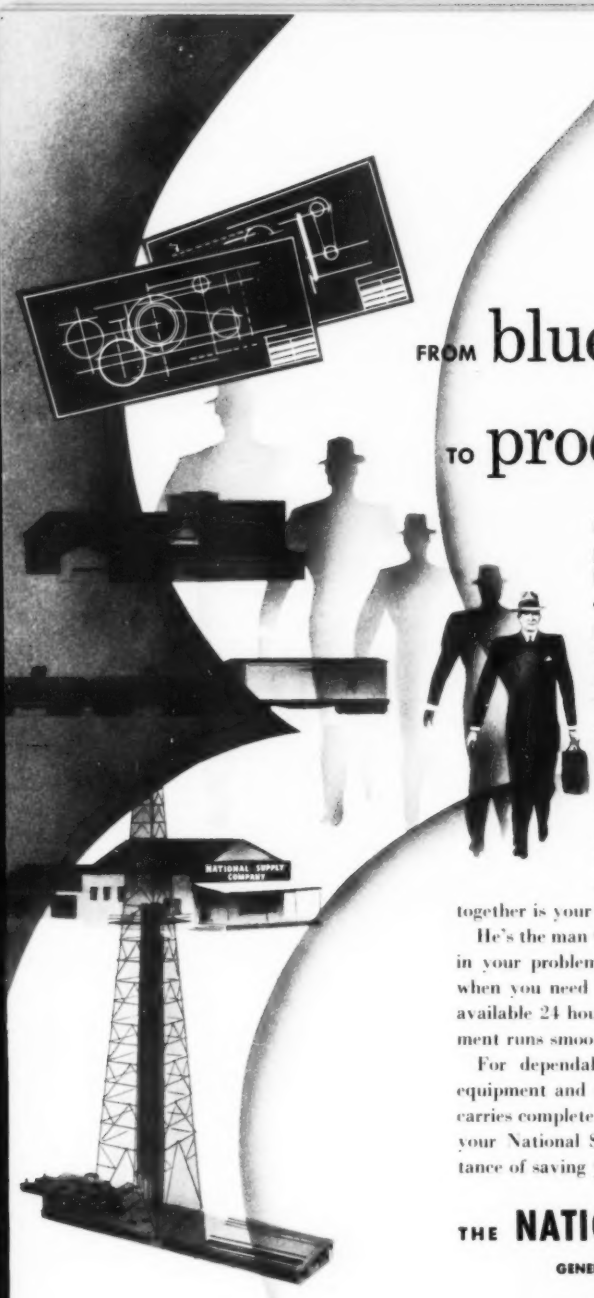
It has positive operation—high safety factors.

Long-wearing—hard faced wedges.

Full opening clearway bore.

Safe—extra heavy walls, high tensile bolting, extra deep stuffing box.

KEROTEST MANUFACTURING COMPANY
PITTSBURGH 22, PA.
New York · Chicago · Charleston, W. Va. · Tulsa · Odessa · Houston
Los Angeles · St. Louis · Toledo · Richmond · Baltimore



FROM blue-prints TO production...

In the production of oil field drilling and producing equipment, National Supply has amassed years of experience. Because of this and the attention to detail in every phase from the drafting board through the factories, the speedy supply routes and convenient distribution points, "National Blue" products have proved themselves to the petroleum industry everywhere.

All these factors helped build The National Supply Company's reputation as manufacturers of rugged, dependable, hard-working oil country equipment. But the force which welds all these factors together is your National Supply field service man.

He's the man who symbolizes National Supply's interest in your problems. His wide oil field experience is yours when you need it, and you'll get help in a hurry. He is available 24 hours a day; his concern is that your equipment runs smoothly and produces quickly.

For dependable service, remember "National Blue" equipment and the National Supply Store near you that carries complete stocks. For dependable advice, remember your National Supply field man, who knows the importance of saving your time.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

NATIONAL BLUE PRODUCTS

SPANG EXTREME LINE CASING

FOR FAST MAKE-UP

The modified Acme-type threads used in SPANG EXTREME LINE CASING guide the pin into quick positive engagement with the box; cross threading is practically impossible. Proper make-up is determined automatically by end-to-shoulder contact. Elimination of couplings cuts in half the number of joints in a string.

POSITIVE FLUID SEALING

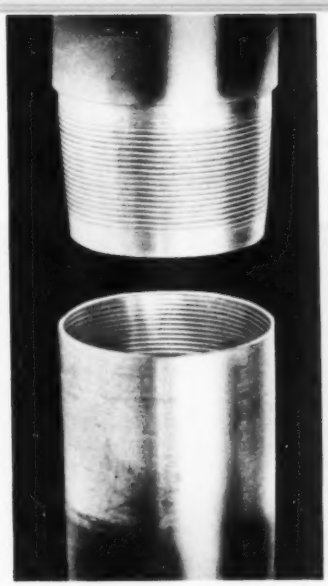
The fluid seal in SPANG EXTREME LINE CASING is independent of the joint threads which serve only as mechanical interlocks. The actual metal-to-metal seal is accomplished by seating a curved surface in a tapered conical seat which assures a tight precision-machined seal.

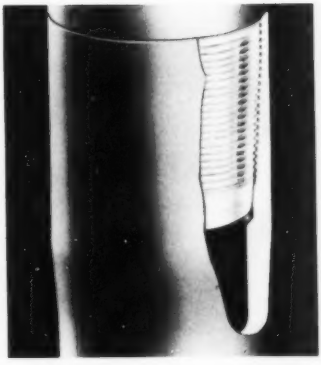
RESISTANCE TO SEVERE AND VARIABLE FORCES ENCOUNTERED IN DEEP DRILLING

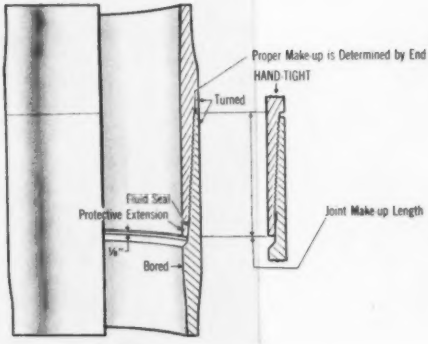
In the manufacture of SPANG EXTREME LINE CASING absolute control is maintained on all essential dimensions because this casing was developed to withstand the extreme conditions in deep drilling. As a result SPANG EXTREME LINE CASING has exceptionally rugged joints, streamlined external and internal surfaces, inherent strength to resist extreme tension, compression and bending.

These important advantages are further detailed in Bulletin Number 352 which lists eight reasons why it pays to use SPANG EXTREME LINE CASING. Write for your copy or ask for details at your National Supply Store.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT · SPANG STEEL PIPE · SUPERIOR & ATLAS ENGINES







THE NATIONAL SUPPLY COMPANY

SPANG-CHALFANT DIVISION

NATIONAL BLUE PRODUCTS

GENERAL SALES OFFICES: Pittsburgh, Pa.

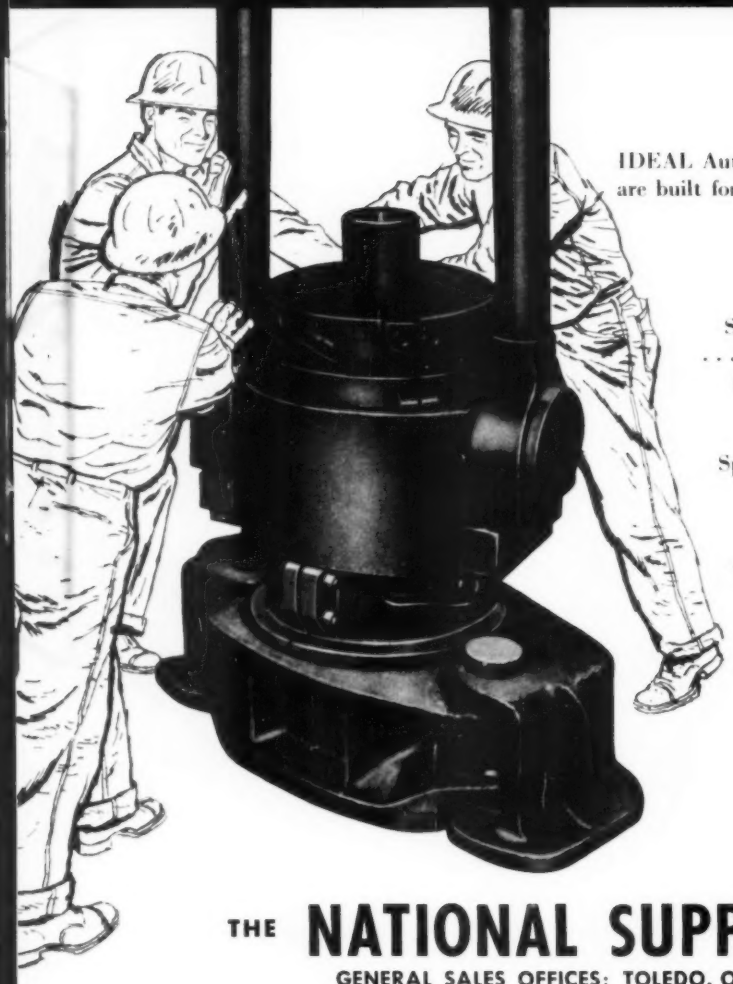
DIVISION OFFICES: Casper; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Limited, 702 Barron Bldg., 610 Eighth Ave., West, Calgary, Alberta

EXPORT: National Supply Export Corporation, 600 Fifth Ave., New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C.2

IDEAL

AUTOMATIC GRIP ELEVATORS and SPIDERS are designed for Safety, Strength, Speed



IDEAL Automatic Grip Elevators and Spiders are built for safe, fast, and dependable service. The grip will support a 20,000 foot casing string without marring or collapsing the casing.

Slips operate in unison automatically . . . can be replaced easily and economically at the rig. The Spider will not release until Elevator holds the casing load. These Elevators and Spiders work with speed because they are operated by one man, on the floor, or in the derrick.

These are some of the advantages of our Automatic Grip Elevators and Spiders. Write for your copy of bulletins describing IDEAL Elevators and Spiders, or see your National Supply representative for details.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

NATIONAL BLUE PRODUCTS

DIVISION OFFICES: Casper; Houston; Ft. Worth; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 702 Barron Bldg., 610 Eighth Ave., West, Calgary, Alberta

EXPORT: National Supply Export Corporation, 600 Fifth Ave., New York 20, N.Y., U.S.A. River Plate House, 12 South Place, London E.C. 2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

TRET-O-LITE

TO HELP YOU PRODUCE PIPE-LINE OIL AT THE LOWEST POSSIBLE COST

1. A complete line of proved TRET-O-LITE dehydrating reagents, designed to correct your emulsion problems, economically.

2. The effective KONTOL Corrosion Inhibitors, in both liquid and stick form, designed to prevent the corrosion of sub-surface and other production equipment.

3. The TRET-O-LITE reagents designed to mitigate oil-in-water problems,—effective stream pollution preventives and sources of savings in salvaged oil.

4. The TRET-O-LITE Scale Preventives, especially developed to prevent production difficulties encountered when hard-water scales are a problem.

5. The SOLVO, PARASOL or PARID paraffin reagents, with solvent and detergent properties, are often economical answers to an annoying paraffin problem.

6. A large staff of trained treating service engineers, located in or near every oil field, always ready to advise and assist you with your production problems.

TRETOLITE COMPANY

Chemicals for the Petroleum Industry

SAINT LOUIS 19, MISSOURI — LOS ANGELES 22, CALIFORNIA

T 51-3

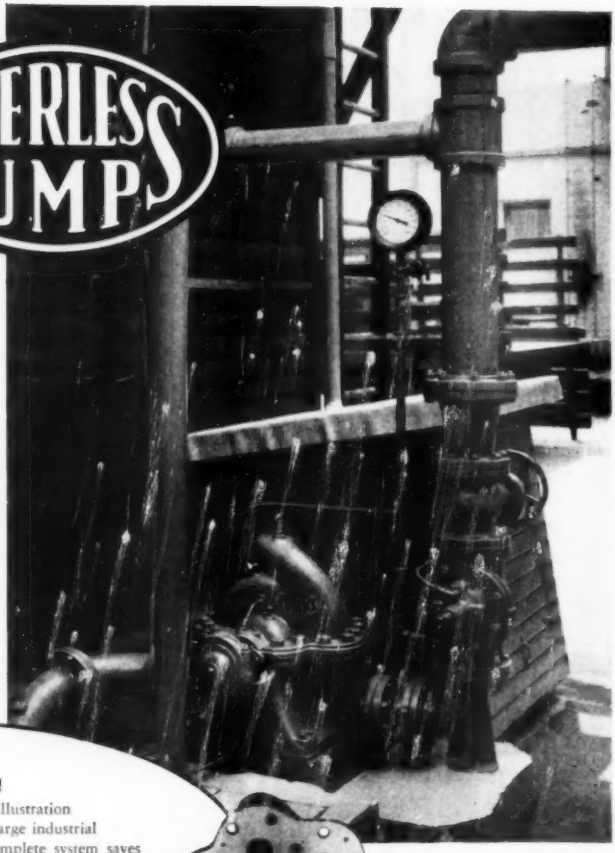
DEHYDRATING • DESALTING • CORROSION INHIBITION • SCALE PREVENTION • WATER DE-OILING • PARAFFIN REMOVAL

PEERLESS Type TU

MULTI-STAGE PUMPS for HOT and COLD LIQUIDS

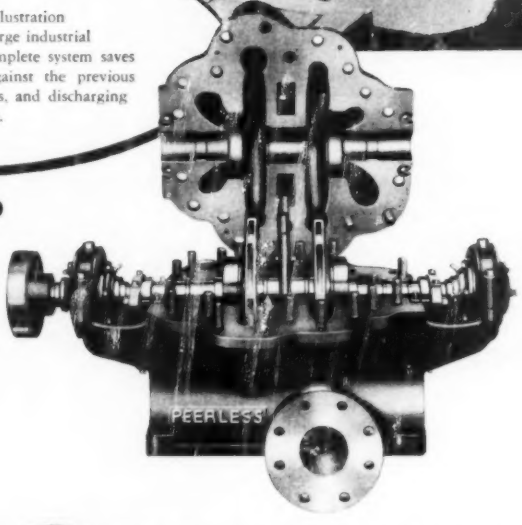
A PLUS in Performance without a premium in price

When moderate capacities and high heads are involved in handling cooling tower water, boiler feed applications, and process liquids, Peerless Type TU pumps will exactly meet your needs. They provide capacities from 50 to 2,500 gpm, head ranges from 250 to 1600 feet and discharge sizes up to 10 inches. The low loop cross-over is cast integral with the top half of the pump case in sizes 4 inches and smaller. Excellent efficiencies and a great number of superior design features that effect long life with minimum downtime provide a performance plus at no extra cost.



MAKING RECORDS!

The Peerless Type TU pump in the illustration operates on a cooling tower system for a large industrial plant. According to their engineers, this complete system saves them over $550.00 every month, as against the previous method of using water from city mains, and discharging into the sewers after one use.



DEPENDABLE, DURABLE AND RUGGED DESIGN AND CONSTRUCTION . . .

Here are a few features of Type TU construction:

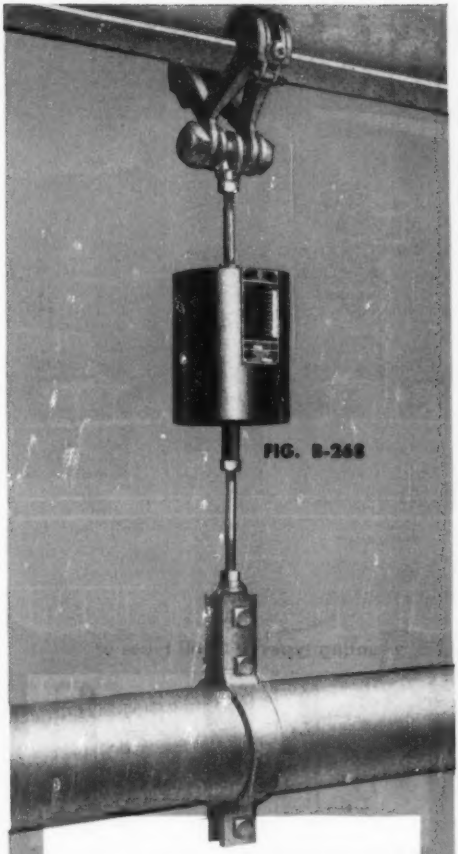
Equipped with duplex angular contact thrust bearings, water cooled bearing housings, heavy stiff case rings, sleeves locked against impeller hubs, in-and-out cooling and sealing connections at stuffing box.

High pressure stuffing box on these pumps is under one stage pressure only, regardless of the net pressure developed by the pump.

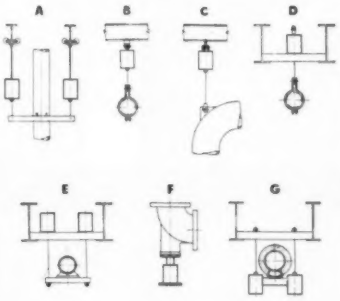
Spacer bushings between stages are serrated with grooves throughout its length, are longer than competitive pumps, thus making an effective seal between stage pressures.

The Peerless Type TU pump is described in Bulletin B-301. Write for your copy today.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Address inquiries to Factories at:
Los Angeles 31, California and Indianapolis 8, Indiana
Offices: New York, Chicago, St. Louis, Atlanta; Dallas, Plainview and Lubbock, Texas; Fresno; Los Angeles; Phoenix; Albuquerque, New Mexico.



TYPICAL APPLICATIONS



(A) Rod threaded to top cap (B) Furnished with single lug (C) Two lug style (D) Top adjusting (E) Adjustable top and bottom (F) For floor support (G) Trapeze assembly.

Pre-solve Pipe Suspension Problems...

with

Grinnell Pre-engineered Spring Hangers

- Maximum variation in supporting force per ½" of deflection is 10½% of rated capacity — in all sizes.
- Precompression* assures operation of spring within its proper working range where variation in supporting force is at a minimum.
- Compact—minimum headroom made possible by precompression*.
- Guides prevent contact of coils with casing wall or hanger rod and assure continuous alignment and concentric loading of spring.
- All-steel welded construction meets pressure piping code.
- 16 sizes available from stock — load range from 74 lbs. to 9000 lbs.
- Easy selection of proper sizes from simple capacity table.
- Installation is simplified by integral load scale and travel indicators.
- Unique swivel coupling provides adjustment and eliminates turnbuckle.

*Precompression is a patented feature.

FOR LESS VARIATION IN SUPPORTING FORCE — FIG. 98

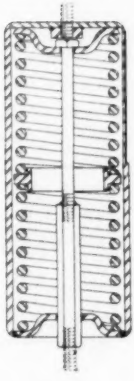


Fig. 98 is an adaptation of Grinnell's popular spring hanger, Fig. 268. It consists of two springs arranged in series within a single casing. A centering guide insures the permanent alignment of the spring assembly.

Fig. 98 has half the load deflection rate, and double the total working range of Fig. 268. Its 16 spring sizes accommodate loads from 74 lbs. to 9000 lbs. — but with a total working range *up to 5 inches!* Fig. 98 comes in the same seven types as shown for Fig. 268. Design details for identical types and sizes are the same for Fig. 98 and Fig. 268.

GRINNELL

WHENEVER PIPING IS INVOLVED

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Look at the Whole Picture...

WHEN SELECTING LEVEL CONTROLLERS

Use the C_Q Method—Evaluate All the Quality Factors

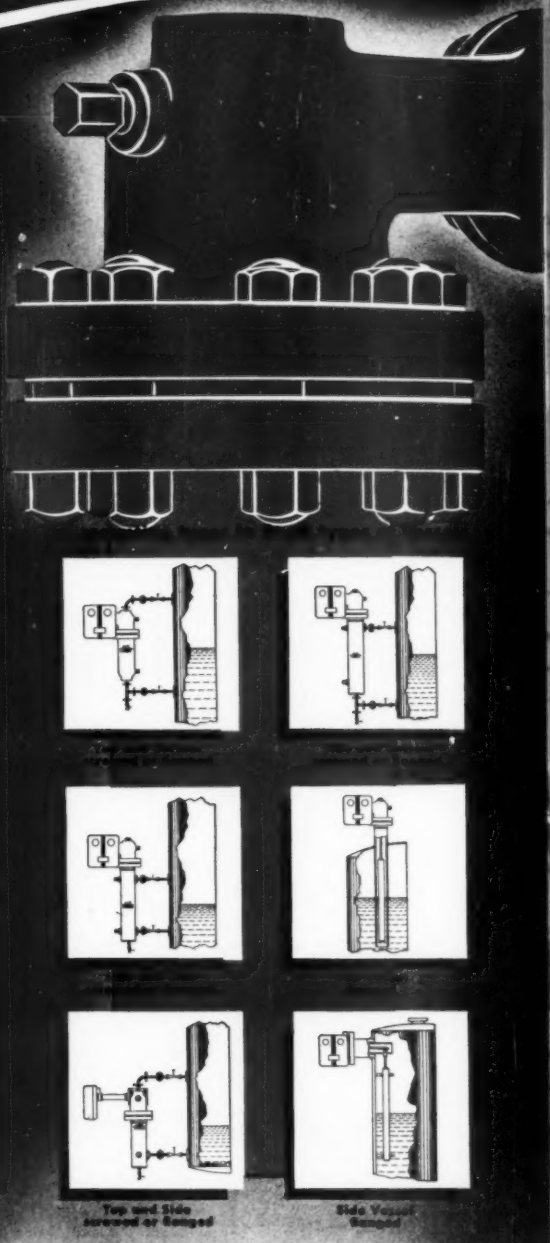
One well designed and manufactured part does not make a level controller that will "provide accurate performance over a long period with a minimum of maintenance and operation delays." *Every* part must be designed and manufactured so that all combine to make a controller which incorporates wise selection of materials for the intended service; skillful design for accurate operation; and experience which forestalls the difficulties you are likely to encounter in the field.

So in selecting level controllers, use the C_Q Method — evaluate *all* the quality factors in relation to your standards. The sum of the value of all these factors is the C_Q (Quality Coefficient). A product with a high C_Q will give you the performance you have a right to expect. And in considering price, don't forget the over-all cost* is lowest for a high C_Q product. For comparison purposes — among comparably priced controllers

$$\text{Real Cost} = \frac{\text{Price}}{C_Q}$$

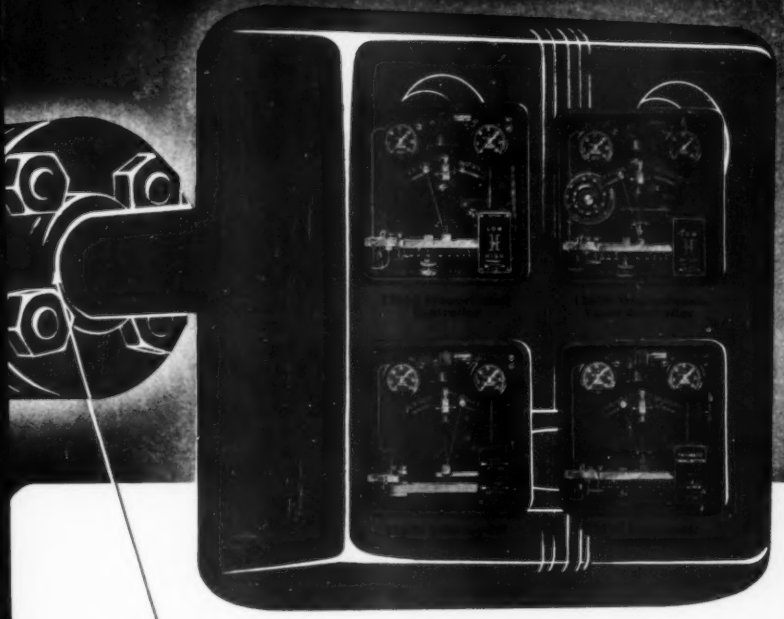
Look at the whole picture — use the C_Q Method — evaluate *all* the quality factors.

*Purchase price plus cost of maintenance and down-time.



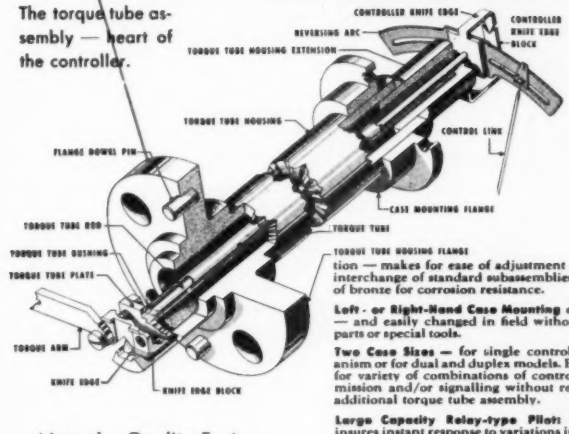
THE MASONEILAN 12000 SERIES LEVEL CONTROLLERS

A High C_Q Product



Three Standard controller types and the transmitter (also pneumatic switch) in the standard case; dual or duplex combinations of these in a larger case.

The torque tube assembly — heart of the controller.



Note the Quality Factors of the Masoneilan 12000 Series Level Controllers

Sturdy Instrument Case with ribbed reinforcements to prevent distortion due to temperature and handling which might create inaccuracy in control mechanism. Aluminum with Weatherproof finish and Gasketed door — protect against effects of weather and corrosive atmospheric conditions.

One Piece Air Manifold eliminates much of air piping inside case — simplifies construction — makes for ease of adjustment and for interchange of standard subassemblies. Made of bronze for corrosion resistance.

Left - or Right-Hand Case Mounting optional — and easily changed in field without extra parts or special tools.

Two Case Sizes — for single control mechanism or for dual and duplex models. Provides for variety of combinations of control transmission and/or signalling without requiring additional torque tube assembly.

Large Capacity Relay-type Pilot: Design insures instant response to variations in nozzle pressure. Includes metering tube for constant nozzle supply. Fastening directly to manifold avoids air piping. Uses minimum air supply.

Simple Proportioning Mechanism: Minimum number of parts, simplified linkage, use of proportional leaf spring — insure instantaneous response. All adjustments simple, with clearly visible scales. Action reversible by one simple adjustment. Proportional band setting independent of specific gravity; scale provides wider graduation spacing in lower settings; causes minimum upset to process because alignment spring, leaf spring and proportional bellows forces in equilibrium at midpoint of output pressure range. Simplified linkage and flexure bearings eliminate lost motion.

Automatic Reset Mechanism: Adds reset response to proportional response. Simple unit adjustable over spiral scale with wider graduation spacing in lower reset rate settings.

Differential Gap Mechanism: Substitutes proportional on-off action for standard proportional action. Provides for adjustable gap between high and low limits.

Selection of Supplementary Functions: Design provides for pneumatic transmitter, pneumatic or mechanical signal switch using same torque tube and displacer assemblies.

Dual and Duplex Types: Selection of combinations of control mechanisms, controller plus transmitter, controller plus switch, etc. — in *one case*; using only *one torque tube assembly*.

Simple Mechanical Indicator inside case provides serviceman with reliable, direct indication of level; has no complicated linkage — requires no field calibration.

Torque Tube Assembly design provides
(a) selection of materials — inconel, monel, stainless steel, bronze.

(b) all parts of torque tube subassembly of same alloy — avoids contamination of the weld.

(c) fabrication by latest type inert arc welding equipment and methods.

(d) knife-edge bearing at each end insures true center of rotation — cannot be off-centered by high temperature or practical tolerances in fabrication — eliminates objectionable friction.

(e) Torque tube length, wall thickness and diameter selected for most desirable combination of low operating stress and load carrying ability.

Displacer Hanger has modified knife-edge bearing at connection to torque arm. Integral or detachable extensions available for internal mounted displacers.

Displacers made of stainless steel tubing; designed so that standard control mechanisms may be used without modification, for all applications.

Selection of Mounting Types available to meet all vessel requirements. Choice of 9 Level Ranges between 14" and 15 ft. (standard). Special ranges may be supplied.

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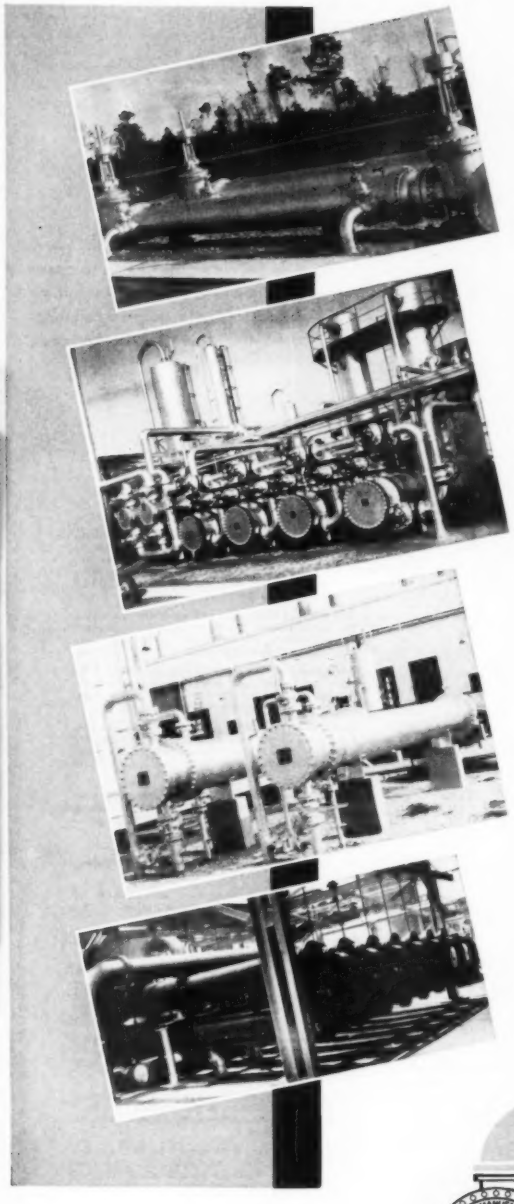

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Within a relatively short period of 15 years the Western Supply Company of Tulsa has gained national recognition as designers and fabricators of heat transfer equipment for the petroleum, pipe line, chemical processing, and natural gas industries.

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Western has gained this acceptance by always doing the job just a little bit better than seemed necessary. Close adherence to rigid engineering codes and specifications . . . modern, up-to-date fabricating equipment . . . trained, experienced personnel . . . plus a willingness to work cooperatively with the customer — these are the elements of PERFORMANCE that have assured industry ACCEPTANCE of Western produced heat transfer equipment.

We invite you to consult with us on all your heat exchanger needs. Detailed information on our fabricating facilities will gladly be forwarded upon your request.

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Manufactured by
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SALES OFFICES — DALLAS — HOUSTON

They Say—

Always a Prospect

Sir:

We have read with interest the editorial . . . "Importance of Williston" (August 23). This item correctly analyzes the several factors which make the Williston basin important and, we believe, gives an accurate measure of the influence that it will have in future prospecting.

The undersigned desire, however, to disagree with the viewpoint expressed that this discovery of oil "demonstrates that oil can be found where older concepts of petroleum geology considered it most unlikely." We do not know of geological concepts, old or new, which would lead to the opinion that this discovery was "most unlikely."

On the contrary, a committee of the Tulsa Geological Society included the Williston basin in their report on "Possible Future Oil Provinces of the Northern Mid-Continent States" which was included in the symposium, "Possible Future Oil Provinces in the United States and Canada," published in August 1941 by the American Association of Petroleum Geologists. As members of this committee, we can, we believe, speak for the entire group when we say that we found many geological factors favorable for the presence of oil in the Williston basin. The unfavorable ones were all economic, and primarily related to distance from markets, drilling depth 10,000 ft. or more in the deeper parts of the basin, and the difficulty of prospecting. . .

It is true that improvement in geophysical technique enables the industry to do a better job of searching for structure, and that improvement in drilling equipment and techniques have made deeper drilling less hazardous. It is doubtful if these alone would have led the industry to search for oil in the Williston basin without the economic urge that has come from phenomenal increases in demand for petroleum, together with a price for crude oil and its products which generates risk capital to do the difficult prospecting and expensive deep drilling.

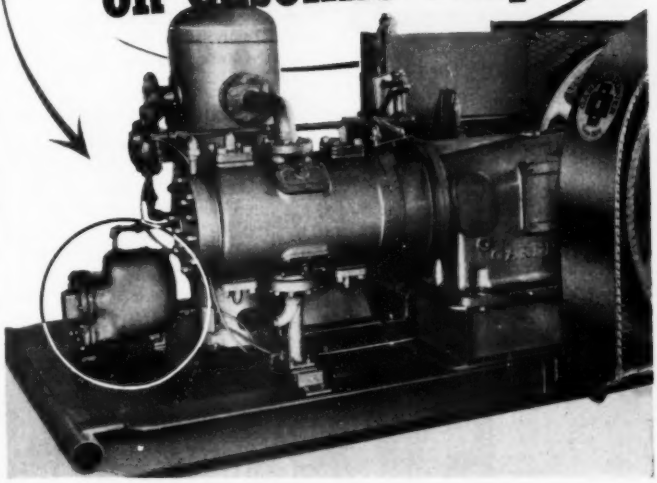
A. Rodger Denison, J. V. Howell, L. Murray Neuman, Tulsa.

Support for Conservation

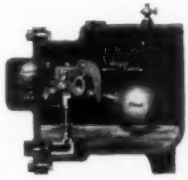
"Among the charges in the anti-trust suit against seven major western oil companies is the accusation that they control and convert to their own selfish purposes the Conservation Committee of California Oil Producers. The suit declares that the

SEND FOR

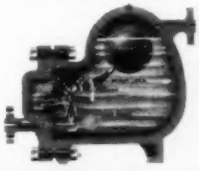
Nicholson Catalog 250 on Gasoline Traps



These Widely Specified Weight-Operated Traps Are Now Serving Many Uses in Natural Gas Industry



Model WO, for press. to 650 lbs.



Model C, for press. to 1500 lbs.

Pictured above, a Nicholson weight-operated trap on a compressor designed for booster, gas lift and repressuring service. It drains gasoline from the scrubber head. Some other common uses of Nicholson gasoline, steam, water traps:

Discharge gasoline and oil from gas well separators, accumulators, after-absorbers, compressor suction lines.

Drain gasoline and moisture forming in low places of field gas lines.

Discharge water collected out of the gas condensate in package and smaller natural gasoline plants.

Also discharge steam condensate from heaters, separators, accumulators and scrubbers in the process stream.

This 32-Page Standard Reference Describes Traps For All Mediums And Pressures

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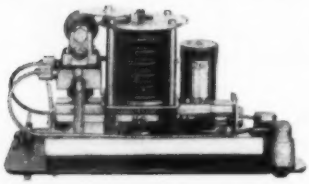
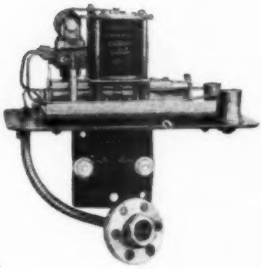
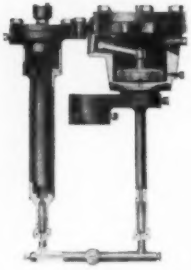
MEASURE

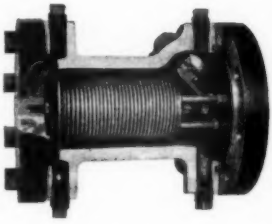


Taylor TRANSAIRE* Transmitters virtually eliminate time lag in measuring and transmitting smallest temperature and pressure changes. Temperature model (*left*) has derivative action, SPEED-ACT*, in measuring circuit, which assures dynamic accuracy under changing conditions. Pressure model (*right*) will detect changes of 1/10 of 1% of the range span, accurate to 1/2% of span rather than pressure level. Temperature and barometric compensation assure consistent accuracy.



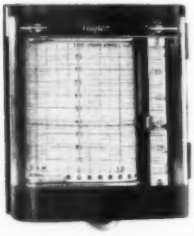


Taylor Differential Pressure Manometers give accurate, dependable measurement of flow, liquid level and specific gravity. Mercury model (*left*) is accurate to ½ of 1% of the range, has interchangeable tubes for continuous ranges from 10 to 500 inches of water. Aneroid (mercuryless) models (*right*) of 300 and 1500 psi working pressures. Range limits: 0 to 20" to 0 to 500" water. Also available in all-316 stainless steel for corrosive mediums.



EVERYTHING'S

RECEIVE

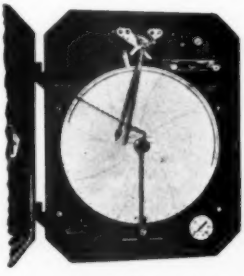


The TRANSET Recorder (*left*) has automatic-manual unit, remote set-point adjustment and valve position indicator. Takes only 4⅜" x 5" panel space, gives a continuous 30-day linear chart record, with 3 hours visible. Electric or pneumatic chart drives.

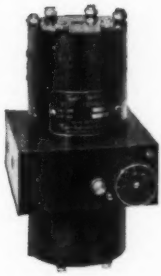
The TRANSET Indicator (*right*) has all the features of the TRANSET Recorder, but gives no chart record. Easy reading 3½" dial, mounts in same size panel opening as TRANSET Recorder.

TRANSET Receiving Flow Integrator (*left*) also takes just 4⅜" x 5" panel space. It totals the flow of liquids and gases, is available in square root or linear forms. Like the other TRANSET Receivers, its small size makes it ideal for graphic panels.

Taylor 84JF Recording Receiver (*right*) is an alternate part of the TRANSET System designed for those who want matching cases on conventional panel boards. Has all the features of the small TRANSET Recorder, but utilizes standard 12" circular charts.

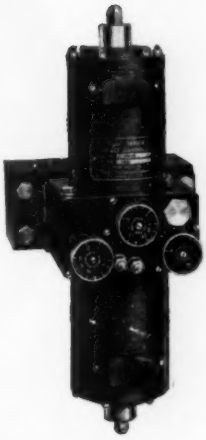


CONTROL



The TRI-ACT* Controller (*right*) is a force-balance pneumatic controller with a new circuit embodying three control responses: proportional, PRE-ACT* (rate action) and automatic reset. Gives precise control never before believed possible, with faster, more stable recovery on load changes, no overpeaking on start-up. Can be locally or panel mounted.

BI-ACT* is TRI-ACT's little brother. The BI-ACT Controller (*left*) is a lower cost instrument with *two* control responses, proportional and automatic reset, both adjusted with *one* stability knob. It's the ideal instrument for dependable, accurate performance on those applications where the quality of control obtainable with derivative response is not essential.



UNDER CONTROL

with Taylor's TRANSET System regulating any process variable*

*Trade-Mark

THE ANSWER to almost any industrial control problem is on these pages. Taylor's New TRANSET Control System can control practically any process variable, with a precision never before possible.

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For full information on how you can profit from Taylor TRANSET Control, ask your Taylor Field Engineer, or write for **Bulletin 98097.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

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Newark 6, N. J., 823 Sandford Ave.
New Orleans 13, La., 1040 Camp St.
New York 56, N. Y., 397 East 167th St.
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Regina, Sask., 2070 Albert St.
Richmond 20, Va., 1617 West Broad St.
San Francisco 2, Calif., 635 Golden Gate Ave.
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defendant companies, through domination of the committee, control production for the purpose of holding up prices, and it asks that the committee be abolished. . . .

"For the seven major companies to dominate this committee is a manifest impossibility. Each member of the committee, large or small, has only one vote. The seven companies comprise only 22 per cent of the total membership; even if they voted as a unit they couldn't very well impose their will on the other 78 per cent.

Moreover, the whole pattern of the committee's workings is voluntary. Nobody has to belong; it has no punitive powers, no enforcement powers; it can only recommend. Indeed, it still happens at times that oil fields in California are wastefully produced. The committee can and does regret this kind of short-sighted performance, but it can't prevent it."

The Bulletin, Standard Oil Co. of California.

Oil's Research Bill

"No industry is more deeply involved in scientific research than oil. Annual expenditures for this purpose now run to more than $100,000,000 a year. The number of technically trained men engaged in research and development is at least 40 times as large as in 1916.

"There are three primary reasons for research—to evolve new oil products, to better existing products, and to reduce the cost to both producer and consumer. Oil has been succesful in all three fields. In 35 years, the actual yield of gasoline from a barrel of crude oil has more than doubled. The potential yield has quadrupled. And the average octane rating of motor gasoline has increased to the point where, in an engine designed to utilize it effectively, one gallon of today's gas will do the work of two of 1916 quality."

Editorial in the Oil City Derrick.

CALENDAR

September

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

Independent Natural Gas Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City, September 24.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

Texas Independent Producers and Royalty

Owners Association, midyear directors' meeting, Tyler, September 28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

National Association of Corrosion Engineers, Permian Basin Corrosion Tour, Odessa, Tex., October 15-16.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

American Chemical Society and Southern Association of Science and Industry, Southwide Chemical Conference, Wilson Dam, Ala., October 18-20.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

American Association of Petroleum Geologists, regional meeting, Commodore Perry Hotel, Austin, Tex., October 18-20.

Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex., October 19.

American Institute of Chemical Engineers, sixth annual South Texas Section technical meeting, Hotel Galvez, Galveston, October 19.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland Cleveland, October 22-26.

Society of Exploration Geophysicists, eastern regional meeting, Webster Hall Hotel, Pittsburgh, October 25.

American Institute of Mining and Metallurgical Engineers, petroleum branch, annual meeting of West Coast chapter, Elks Club, Los Angeles, October 25-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

American Institute of Mining and Metallurgical Engineers, fall meeting of all branches in connection with Mexican Bureau of Mines, Hotel Del Prado, Mexico City, October 29-November 3.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Roosevelt Hotel, New Orleans, November 1-2.

American Association of Petroleum Geologists, Pacific section annual fall meeting, Ambassador Hotel, Los Angeles, November 1-2.

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Southwest Research Institute, second conference on coastal engineering, Rice Hotel, Houston, November 7-10.

Gulf Coast Association of Geological So-

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cieties, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., December 7.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

1952 MEETINGS

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 19-21.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Gas Association, Natural Gas Department spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Society for Testing Materials, annual meeting, Hotel Statler, New York, June 23-27.

NOMADS

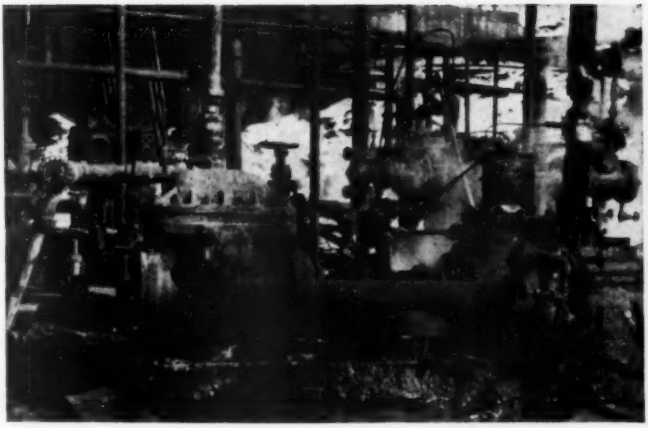
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas - Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.



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—for anything but a

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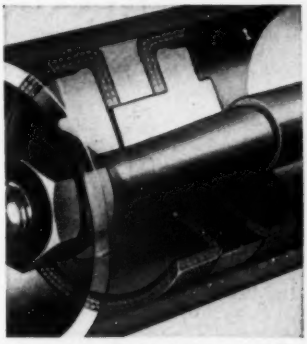
"HOW tough can life get", says ordinary packing inside this pump. Yet, year after year this pump is required to handle acid treated oil products from the base of a heated still to the next purifying process.

Ordinary packing would soon allow slippage to occur—but not Darcova Pumcups. Pumcups retain their efficiency even when severely worn. This installation has operated efficiently for over eight years.

No matter how tough your pumping problem may be, you can do it more efficiently and for lower cost with Darcova Pumcups!



Cross section showing Pumcup installed.

Write for free bulletin No. 4401 on how Pumcups can help solve your pumping problems!

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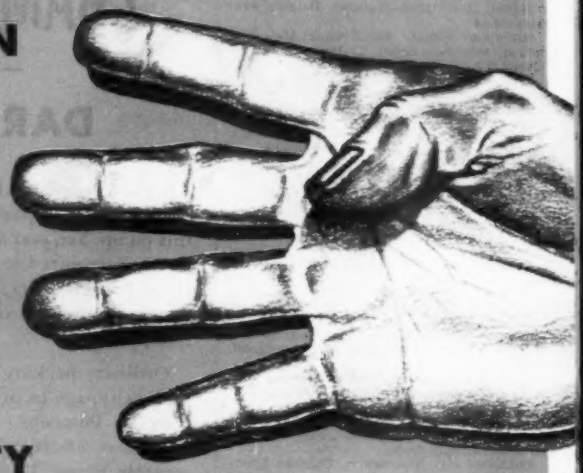

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JOURNALLY Speaking

Liquid Capital

MEMBERS of the A.I.M.E. attending the fall meeting in Mexico City will find this third-largest city in North America losing altitude. Our authority for this statement is the National Geographic Society, which explains it this way:

"Thousands of artesian wells pierce the thin crust of solid earth on which the Mexican capital 'floats.' Beneath is a slippery mush of volcanic ash and water. As the water is pumped up, the soft surface earth goes down. Thus, say engineers, are Mexicans drinking up their own foundations.

"While the city sinks—it has dropped 14½ in. in the last 8 months—some heavy buildings settle even faster. The massive Palace of Fine Arts has sagged some 15 ft. below its original level. Yet other structures seem to grow taller. Set on deep pilings, they hold their level while surroundings sag.

"The capital now faces a plumbing crisis. Unless emergency measures are taken soon, warned the municipal engineer recently, the main drainage system will reverse its flow."

This would seem to present a challenge to the visiting engineers; which may be one reason Mexico invited them.

Specter Inspector

THIS department's several recent references to petroleum antiquities has brought forth a plea for help from Art Langton, editor of the Baroid News Bulletin.

Art, it seems, is a collector of oil ghosts, such an ardent collector, in fact, that he holds (or gave himself) the title of "Chief In-Spectre of the Ghostly Order of Hydrocarbons." The kind of ghosts Art collects is stories of oil ghost towns, towns which boomed and bloomed like a rose (well, maybe like a thistle) on the heels of an oil strike and then faded into oblivion leaving only deserted buildings weathering in the sun.

Art loves to visit these long-abandoned relics of a bygone era and take pictures of caved-in roofs and rotting bull wheels. He reminisces over the eight-horse teams which once sank in the mud of the now grass-grown main street, becomes nostalgic in the ruin of the long-dry saloon, and conjures up visions of fast-changing fortunes in the rustle of a yellowed slip of paper. Then he goes back to Los Angeles and writes a piece for his magazine. Just how this helps Baroid sell drilling mud is beyond us, but that's Brother Langton's problem.

The point of all this is that the Langton Collection of old ghost towns is disappointingly small, and Curator Langton wants help. To anyone sending him authentic information about the location of a genuine abandoned ex-oil town he will award a handsome scroll attesting the bearer a Spectral Molecule in the G. O. of H.

Mining ghost towns are scattered all over the Far West and some of them are becoming popular tourist attractions. Maybe the reason oil ghost towns are so scarce is that a good oil field doesn't play out suddenly like an ore vein but keeps producing for many years, adding to the local economy and building up a permanent community. We wish Art Langton luck in his hobby, but we're sure that any real oil ghost towns he discovers will be very, very old, indeed.

Down Under

WITH plans for Oil Progress Week now being made all over the country, it is of interest to note the formation of the Petroleum Information Bureau (Australia) in Melbourne, which, according to the brochure, is modeled after and will function much as our own American Petroleum Institute and Oil Industry Information Committee.

Australia has no oil-producing industry to speak of but it is highly dependent on oil nonetheless, and the local refiners and distributors feel the need of giving consumers more information about their activity and their product. Because oil's progress is greatest where there is free enterprise, and because Australians at times have been a bit cool toward private capital and competition, this P.I.B. might turn out to be very fruitful. First thing you know there may be an Aussie version of Oil Progress Week.

—Henry D. Ralph

Rigging Up!

● "Rigging up" is a familiar sight in the oil fields...it means they're getting all the necessary equipment and materials in place to begin operations—drilling the well.

"Rigging up" or building a cement plant means about the same thing... getting ready to begin operations—making cement.

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Photo, below, taken several months ago, shows rapid construction progress at new Lone Star Cement plant, at Maryneal (near Sweetwater) in West Texas—third Lone Star mill in the Lone Star State.

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Service? Here is a business of serving human wants with more and better products, a business of utilizing and conserving a natural resource, a business striving for better public understanding.

If you are looking for a future, look here, young man.

THIS WEEK

INDUSTRY—Turning point in history of oil, gas regulation reached when FPC ruled it had no jurisdiction in Phillips case. Thompson of Texas Railroad Commission tells Interstate Oil Compact Commission. . . . 'Compact goes on record in favor of wide spacing patterns for oil reservoirs. . . . Group told that unitization faces many problems. . . .

REFINING—American Chemical Society symposium gives members insight into future trends, development in refining technology. . . . Role of catalysts in conversion of petroleum receives special attention. . . . 'Advantages of integrated refining units emphasized by Standard Oil Development Co. head. . . . 'Pan-Am Southern lets contract to Lummus Co. for new 20,000,000-lb. coking unit at Destrehan, La., refinery. . . .

PRODUCTION—Justice Department charges Long Beach Harbor operations are getting too close to tidelands reserve area. . . . 'Big pressure-maintenance project at Willamar West field in Willacy County, Texas, now operating following official dedication of plant. . . . 'Amerada has indicated another new oil discovery in North Dakota. . . .

INTERNATIONAL—Venezuela's first National Petroleum Convention under way in Caracas. . . . Minister of Mines and Hydrocarbons declares country's oil will continue to help in struggle to preserve western civilization; says Venezuela will make effort to attract more oil companies. . . . 'Increasing economic troubles in Iran arise due to standstill of oil industry. . . . 'Establishment of major European refining industry now realized, with 1,300,000-bbl. daily output seen by mid-1953, OEEC reports. . . .

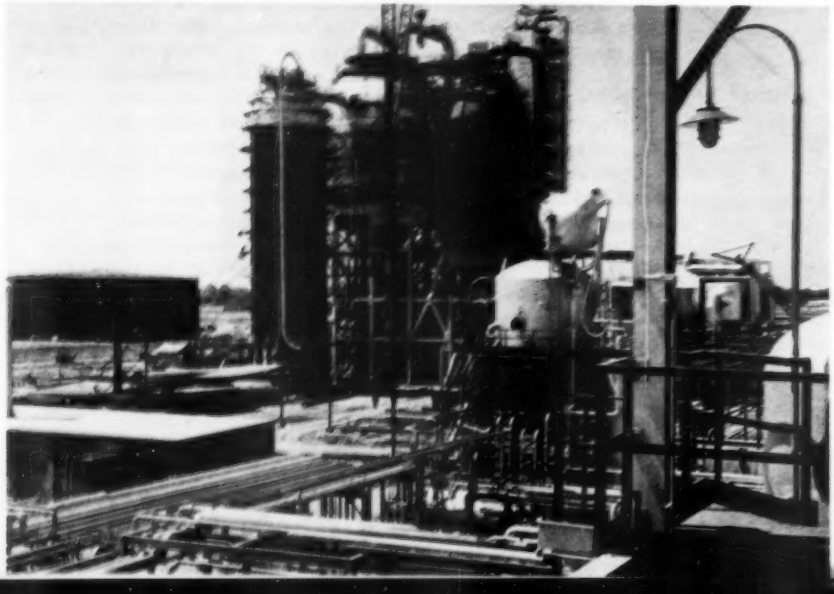
STEEL—New specifications for obtaining tubular goods outlined by PAD officials to representatives of 14 industry associations. . . . Difficulties of allocating supply available cited. . . . 'PAD warns operators that deadline for applications for tubular goods to be delivered during first quarter of 1952 is September 30. . . .

ACTIVITY—Crude production increased 48,675 bbl. daily for the week ended September 8 to 6,206,350 bbl. daily, a new record. . . . 'Total completions for the week dropped to 392 wells from the all-time high of 393 a week earlier. . . . Wildcat completions decreased 25 wells to 207. . . . 'Rotary rigs operating in the United States on September 3 set a new record at 2,770, up 47 over the previous week. . . .

TRENDS—Refinery runs reached the all-time high of 6,666,000 bbl. daily for the week ended September 1. . . . New record is 600,000 bbl. daily or 10 per cent greater than average for August 1950. . . . 'Greatest gain was in District 3, up 312,000 bbl. or 14.3 per cent. . . .

WASHINGTON—Office of Price Stabilization plans investigation of prices received and paid for fuel oil exported from East Coast points to see if ceiling prices are being violated. . . . 'DPA calls for elaboration of Interior Department's scheme to guarantee market prices for coal-hydrogenated fuels. . . .

OFFICIALLY OPENED—Prime Minister Clement Attlee of Great Britain officially opened the new Esso refinery at Fawley, England, on September 14. The largest refinery in Europe, Fawley, with other new plants, will play a major part in raising the country's production of refined products to more than 140,000,000 bbl. yearly. Fawley alone will account for nearly 10 per cent of domestic production. This view shows the fluid catalytic cracking unit. The Organization for European Economic Recovery (OEEC) has reported that its long-range refining program in Europe has been successful, and that establishment of a major European refining industry is now a reality. (See International).



Milestone Reached

FPC's decision in Phillips case is a turning point in history of oil, gas regulation, Thompson tells Compact

Henry D. Ralph

FORT WORTH.—The decision of the Federal Power Commission not to attempt to regulate the production and gathering of natural gas made recently in the case of Phillips Petroleum Co., is a turning point in the history of oil and gas regulation, Commissioner Ernest O. Thompson of the Texas Railroad Commission declared here this week.

Coupling this event with the recent request of the Petroleum Administration for Defense that state regulatory bodies increase allowables because of the shutdown of Iranian production, Thompson said there is now federal recognition of state sovereignty and state responsibility in oil regulation.

The Phillips decision he said recognizes the principle upon which the Interstate Oil Compact was founded. That is that state regulation should be extended to prevent the development of a "twilight zone" between state and federal governments which would invite complete federal regulation.

Gas regulations reviewed. — Charles Crenshaw, assistant attorney general of Texas, reviewed the history of gas regulation and the Phillips case before the legal committee of the Compact, after which there was an open forum at which it was agreed that federal attempt to regulate this field would bring "compounded confusion."

The lesson here, said Gov. Allan Shivers of Texas, chairman of the Compact Commission, is that states must assume the complete regulation of natural gas or else leave the door open for another attempt at federal control. States owe an obligation to the industry, he added, to promote conservation and also to develop maximum and efficient production and utilization of gas.

Would kill progress.—Several of the state officials participating in the round-table discussion voiced the view that federal control of natural gas would kill all progress in state regulation and the development of oil and gas conservation. For example, it was pointed out, a state could not order the reinjection of oil-field gas for pressure maintenance if that gas had been dedicated to serve consumers in a distant city but without federal control it can do this and thus increase oil recovery.

The Phillips case, it was said, is the first time there has been an official public record of the real interest of producing states in retaining gas regulation and of the problems involved and the way in which state regulations operate to promote conservation. However the attorneys present warned that the danger of federal control did not end with the FPC decision and some of them suggested that producers and gatherers would be wise not to transport gas beyond the final processing plant to connec with an interstate line or else they may run the risk of being classed as interstate transporters.

Favors wide spacing.—The Compact Commission put itself on record this week as favoring wide well spacing rather than close-spacing patterns, thus terminating a controversy which has been argued before it and elsewhere for several years.

In adopting the final report of its research and coordinating committee, the Compact took the position that spacing should be dictated by field conditions as related to the ends of conservation and by economies as related to market demand for oil at a given time, rather than by any mathematical formula.

The extensive engineering report, prepared under the direction of Committee Chairman G. E. Eddy, director of the Michigan Conservation Department, reviewed the writings of many authorities on the influence of well density on the volume of ultimate recovery from a reservoir and concluded that all authorities oppose close spacing except C. W. Tomlinson, consulting geologist. The committee's report adopted the position of such outspoken advocates of wide spacing as H. H. Kaveler of Phillips Petroleum Co.; John C. Bartram of Stanolind Oil & Gas Co.; and Morris Muskat of Gulf Oil Corp.

Spacing should vary. — Spacing patterns should vary with the type of reservoir, the committee said, and for economic reasons it may often be wise to start with wide spacing until there is a pressing market demand for additional oil and then infill drilling may be allowed where this will permit oil to be produced at a faster rate without materially reducing ultimate recovery. Representative statements from the report are:

"In water-drive or combination gas and water-drive reservoirs, within normal ranges of porosity and permeability, the volume of ultimate recovery of oil is not dependent on well density. Wider spacing than normally used may be sufficient, depending on structural, reservoir, and fluid characteristics."

"If the aim in reservoir control be that of securing the greatest ultimate recovery of oil from the reservoir as a whole the question of location of wells ceases to be that of density, or spacing on some geometrical pattern. Rather, well locations will be chosen to fit structural and reservoir characteristics, or peculiarities, including the many possible variations in different sections of the same pool."

"The ends of conservation and the demands of economics would be fully served if fields or pools could be originally developed on wide spacing patterns to determine the field limits and the reservoir and fluid characteristics. Following the studies thus made possible infill wells could be located and drilled to provide adequate reservoir drainage and to meet the requirements of conservation, economics, or expediency."

"Important document."—Kaveler, who was present to urge adoption of the report, said that "the report bids fair to become an important document in the history of oil production and conservation. If operators will base their spacing in conformity with this report they will save steel and find more oil, and the steel and money saved in field development can be used to better advantage in wildcatting because the national need today is more reserves rather than greater current production."

Unitization Problems

They prevent wider use, Kaveler tells Compact

FORT WORTH.—The principle that unit operation of an oil pool will increase the ultimate recovery of oil is now firmly established but a number of practical problems prevent wider use of unitization, Dr. H. H. Kaveler, of Phillips Petroleum Co., Bartlesville, Okla., told the secondary-recovery advisory committee of the Interstate Oil Compact Commission here September 10.

It is established that oil will not produce itself and therefore water and gas drives must be controlled, that ownership of the oil must be divided among the surface owners by an equitable formula, and that a fair method of division can be obtained only through agreement of the surface owners, he said, but progress is blocked by these seven problems:

1. Die-hard owners hold for individual operation in the absence of compulsory statutes such as in Oklahoma, Arkansas, and Louisiana.

2. The public generally and royalty

owners in particular are not sufficiently educated as to the increased recoveries possible by unit operation.

3. State commissions do not have adequate power to prevent the drilling of wasteful and uneconomic wells between the discovery of a pool and the time sufficient data are obtained to permit the formation of a unitization program, with the result that often many useless gas-cap wells are drilled on a uniform-spacing pattern and the cost of including them in a unit plan becomes so great that unitization is uneconomic.

Conflict noted.—4. The principle that owners must share equitably in accordance with the oil under their land is in conflict with state-allowable formulas which give too large an allowable to wells on small tracts or the edge of a pool, with the result that owners of such wells will not enter a unitization plan unless given a disproportionately large share.

5. Failure to recognize that pools operated inefficiently without unitization may not produce as much as originally expected and that substantial readjustments to reality may be necessary when unit operation begins.

6. Some producers think they have a monopoly on knowledge of how to produce an oil field and will not trust any other operator to direct a unit plan or insist on retaining a "Russian-type veto" over the recommendations of the majority of operators in the unit.

7. Engineers have a tendency to overextend themselves technically, and to predict unusual and unprecedented disastrous results from the reinjection of water or gas which produced oil the first time through the sand without causing the predicted bad results.

Refining Symposium

Members of A.C.S. petroleum division get insight into future trends and development in refining technology

George Weber

NEW YORK.—The role of catalysts in the conversion of petroleum received special attention here as the American Chemical Society's Division of Petroleum conducted a 2-day symposium on progress in refining technology during the past quarter century last week. The symposium was part of a 2-week International Chemical Conclave celebrating the seventy-fifth anniversary of A.C.S.

The group of 31 papers, authored by experts in their respective fields, dealt mainly with the historical significance of the various techniques of separation, conversion, and analysis.

An insight into future trends and developments in refining technology was given in the remarks of several authors who stated their views on needed improvement and probable new means to achieve them. New catalysts, additives for lubricants and burning oils, new precise distillation techniques, and improved engineering to reduce unit investment, were indicated as important future developments.

Introducing the symposium, Chairman Robert E. Wilson, of Standard Oil Co. (Ind.), stated that about 60 per cent of the gasoline coming from American refineries now consists of new molecules which were synthesized in the refinery and not present in the crude oil charged to stills. The high percentage of conversion products, comprising alkylates, polymers, and cracked hydrocarbons, attests the progress in commercial catalytic conversion during the past 15 years. V. N. Ipatieff, of Universal Oil Products Co., honorary cochairman, drew on more than 50 years' experience in catalytic research to outline the development of modern catalysis from the early experiments dating from the turn of the century.

Moving-bed process.—In reviewing the fixed-bed and moving-bed catalytic processes, D. B. Ardern and J. C. Dart, of Houdry Process Corp., and R. S. Lassiat, of Sun Oil Co., concluded that the prospects for improvement in the moving-bed process appear to be in the direction of improved catalysts providing greater gasoline yields and permitting higher regeneration rates through greater chemical and physical stability. Improved catalysts were also anticipated in fluid catalytic cracking. E. V. Murphree of Standard Oil Development Co., in his paper on that subject, further pointed to substantial fluid cracking improvements mainly mechanical in character, which will integrate fluid cracking units into refinery operations as a whole, and result in investment and operational savings.

A.C.S. COAUTHORS.—A. Jonnard and O. A. Ccllen, of Shell Chemical Corp., New York, were coauthors of a paper on aliphatic chemicals presented at the American Chemical Society Division of Petroleum's symposium on "Twenty-five Years of Progress in Petroleum Technology." More than 75 per cent of all aliphatic chemicals produced in this country originate from petroleum and natural gas, said the authors. Total production of this class of synthetics has increased 16-fold in the past 25 years.

Fluid hydroforming.—H. G. McGrath and L. R. Hill, of M. W. Kellogg Co., reported on results of pilot-plant studies of the newly developed fluid hydroforming process. As compared with the former fixed-bed hydroformer, the new-type unit will yield higher quantities of gasoline, reduce investment and operating costs considerably, permit longer onstream time, raise the octane ceiling, and afford considerable flexibility with regard to feed stock boiling range and composition.

Recognizing that alkylate will not be used to power aircraft in the long-range future, A. V. Mrstick, K. A. Smith, and R. D. Pinkerton, of Sinclair Research Laboratories, pointed to the need for cutting alkylation costs if that operation is to be competitive for producing motor-fuel blends. Improvements in reactor design, catalysts, and catalyst-regeneration techniques were cited as prime needs. The authors reported on a previously unpublished correlation relating alkylate quality to operating conditions.

Petroleum sulfur.—Discussing desulfurization and sweetening, Thomas Tait, of Anglo-Iranian Oil Co., Ltd.'s research station, Sunbury-on-Thames, Middlesex, England, reported that approximately 5.3 million long tons of sulfur are produced annually in crude petroleum throughout the world. Of this total an estimated 2.6 million long tons are produced in North America, 1.4 million in South America, and 1.1 million in the Middle East. Citing the practice of removing hydrogen sulfide by selective absorption, stripping off the H_2S and recovering the sulfur by partial oxidation, and catalytic conversion to elemental sulfur and water, he stated that there is no theoretical reason why recovery should not be accomplished in a single step, eliminating the absorption process. He predicted wide adoption of any such short-cut process, should it ever reach economic development.

Lube performance.—At present there appears to be little promise of improving the performance of lubri-

cants through development of new methods of refining, concluded R. J. S. Pigott and H. A. Ambrose, of Gulf Research & Development Co., in their joint paper on petroleum lubricants. They foresee, however, the continual improvement of lubes through the development of better additives. Improvements in process design and equipment for producing lube stocks are, on the other hand, quite probable, according to G. C. Gester, Jr., of California Research Corp. Today's countercurrent packed solvent extraction tower is not the ultimate in contacting and separating equipment, Gester said. The desirability of a more compact, economical, and efficient device is self-evident.

One possible means, already commercially successful on a large scale, is the Podbielniak centrifugal countercurrent contactor and separator. He also pointed to new extractive solvents which show promise in aromatics separation, and touched on the new selective adsorption methods for separating benzene and its homologs from aliphatic hydrocarbons. He expressed the hope that the next 25 years will bring the development of chemical-engineering techniques for predicting solvent dosages and operating characteristics for extraction processes which will utilize basic physical chemical properties and the fundamental concepts of mass transfer involving individual film resistances and driving forces.

New distillation technique.—The rotary column was again mentioned in the paper on petroleum distillation, by W. E. Bradley and G. R. Lake, of Union Oil Co. of California. The principal of spinning a cooled rotor at high speeds inside heated shell, which develops the equivalent of an extremely high number of theoretical plates, was cited. This development, now under study by A.P.I. Project 6 and the Bureau of Standards, may well influence the distillation science of tomorrow, the authors said.

Coke demand.—Approximately 18 per cent of petroleum coke produced in this country is presently consumed in the manufacture of anodes for the electrolytic production of aluminum, according to Charles L. Thomas of Great Lakes Carbon Corp. The planned 50 per cent expansion in aluminum capacity in 1953 will raise the estimated demand for petroleum coke for this purpose to about 900,000 tons per year. In addition to this use for coke, second only to its use as fuel, Thomas discussed petroleum-coke usage for making synthetic graphite and as foundry coke.

Pollution abatement.—In a separate symposium on Liquid Industrial Wastes, sponsored by the Division of Water, Sewage, and Sanitation Chemistry, N. J. Gothard and J. A. Fowler, of Sinclair Refining Co., described an all-out program undertaken at the company's East Chicago refinery. The most important feature of the Sinclair program for pollution abatement was the reduction of the volume of over-all refinery effluent discharged to Lake Michigan.

Cooling towers were installed for recycling all cooling and condensing water and process water was reduced in volume wherever possible. This resulted in a current effluent volume of approximately 5,000 g.p.m. as compared with 100,000 g.p.m., the estimated present rate, had not such measures been taken. Plans now under execution will further reduce the total refinery effluent flow to 3,000 g.p.m.

Efficiency of oil removal from this reduced waste-water volume, in a newly designed A.P.I. separator, was so greatly improved that the oil content in separator effluence was cut in half. This was accomplished over a period during which refinery runs rose from 55,000 to a high of 95,000 bbl. per day. Improved housekeeping and the construction of some units to prevent water pollution in the refinery have resulted in the total elimination of sulfides and the 90 per cent reduction of phenols as problem pollutants.

New officers.—F. E. Frey, of Phillips Petroleum Co., is the new chairman of the A.C.S. Petroleum Division, succeeding B. H. Shoemaker, of Standard Oil Co. (Ind.). A. L. Lyman, of California Research Corp., was named chairman-elect, and will succeed Frey as division chairman 1 year hence.

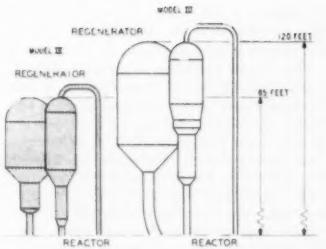
Integrated Units

Savings cited in use of new-type refining setup

NEW YORK.—Investment savings of 30 to 40 per cent are possible through the integration of crude distillation, catalytic cracking, naphtha reforming, and light ends processing facilities in future refineries, E. V. Murphree, president of Standard Oil Development Co., said here in a discussion of the fluid catalytic cracking process before members of the American Chemical Society at the International Chemical Conclave.

This interesting design development, which is said to parallel the improvements brought about by the old thermal combination units of the late 1920s, has already been incorporated, Murphree said, in several units now undergoing mechanical design or construction. The new design developed by Standard Oil Development is said further to permit reduction in refinery handling losses, personnel requirements and fuel steam, and cooling-water requirements.

While little elaboration of these broad statements is available at present, the integration of several processes into one unit is understood to entail a saving in heat transfer, a consolidation of fractionation, and more direct and economic use of the heat of catalyst regeneration. It connotes the close integration of crude and product distillation, catalytic cracking, catalytic or thermal reforming, gas recovery, and possibly other unit processes into a single multipurpose plant which will be operated—and turned around as one.



***COMPARISON.**—This schematic comparison of Standard Oil Development Co.'s Model III and new Model IV fluid catalytic cracking unit designs indicates the relative sizes of two units of the same capacity. Investment saving due to the new simplified design is said to amount to an estimated 25 per cent.*

Capacities.—Such units can be designed in sizes ranging from 2,000 to 60,000 bbl. of crude charge per day. They are said particularly to favor the small refiner, since studies show that a 10,000 bbl. per day combination unit could compete economically with a 50,000-bbl. per day refinery employing the conventional processing sequence. Murphree's conclusions relating to the investment savings of 30 to 40 per cent were based on relative costs in the Gulf Coast.

The first three units of this design will be installed outside the United States. All are S.O.D.-designed and will incorporate the company's new Model IV fluid catalytic cracking unit, or modifications of it. The first on stream will be an addition to the Edmonton, Alta., Canada, refinery of Imperial Oil, Ltd., Jersey Standard's Canadian subsidiary. The Edmonton project includes a 10,000-bbl. per day fluid catalytic cracking unit, a 10,000-bbl. per day vacuum crude-distillation unit, and light ends recovery facilities. The $5,000,000 project contracted by Foster Wheeler, Ltd., of Canada is slated for completion during the summer of 1952.

Belgium project.—Another project which will incorporate the new design features is the 25,000 bbl. per day refinery now under construction by Esso Standard Refinery at Antwerp, Belgium. This complete new refinery will include two-stage crude distillation, fluid catalytic cracking, thermal naphtha reforming, and gas recovery. It is designed by S.O.D. and contract

for erection has been let to Lummus Co. Completion is anticipated possibly by mid-1953.

The third refinery, another project to be built from the ground up, is the Durban plant of Standard-Vacuum refinery of South Africa. Final design of this new refinery, just announced, calls for a crude capacity of 15,600 bbl. per day. Fluid catalytic cracking, thermal reforming, and vacuum distillation will be incorporated in the closely integrated unit. Actual construction has not yet begun by Foster Wheeler Corp., which has the contract, and completion is not scheduled until late 1953 or early 1954. The plant will cost nearly $17,000,000 and will produce motor gasoline, power and illuminating kerosine, diesel fuel, and fuel oils.

Contract Let

Pan-Am plans coking unit at Destrehan, La., refinery

NEW ORLEANS.—Pan-Am Southern Corp. will start work at its Destrehan, La., refinery within a few weeks on the first major unit for production of coke from crude oil in the Gulf Coast area.

The coker will produce about 20,000,000 lb. of coke each month. Construction will be by Lummus Co., with whom Pan-Am signed a contract last week. The new plant is in addition to a multi-million-dollar construction project kicked off last month at Destrehan.

The company is already building a catalytic-cracking unit, a fluid hydroformer, alkylation and vapor-recovery facilities at Destrehan.

Second unit.—The new coker is the second such unit to be built by the company. The first was erected at its El Dorado, Ark., plant last fall during a construction program completed in less than a year.

The 240-ft. Destrehan coker will be capable of processing either heavy crude oil or heavy bottoms from an adjacent refining unit processing light crude. The facility will charge about 9,000 bbl. daily of these feed stocks and convert the heavy material into gasoline, light gas oil, and coke. The coking unit is intended primarily to produce high yields of gas oil which may be further processed in the cracker to high-octane aviation or motor gasoline.

Roy J. Diwoky, Pan-Am's executive vice president, said the unit will maximize the expanded refinery flexibility from an operating standpoint of processing all types of available crude oil. It will also permit varied operation with the demand for products other than gasoline such as asphalt, residual fuel, and domestic heating oils. Still another factor was the growing demand for coke to meet increased aluminum-refining needs, Diwoky said.

(A detailed engineering article on the expansion program at Pan-Am's refinery will be found on page 100 of this issue.)

ROCKY MOUNTAIN

Another Oiler Indicated

WILLISTON, N. D.—Amerada Petroleum Corp. has indicated another discovery at 1 Harry Bakken, SW NW 12-157n-95w, 12 miles north and a little east of the first commercial oil well in North Dakota, recently completed by the same company.

The new discovery was indicated when the 1 Bakken had oil to the surface in 40 minutes on a drill-stem test at 8,304-60 ft. The well was flowed to pits and though no gage was taken Amerada reports that the oil flow was substantial.

The tested interval has not been definitely defined but on regional correlations it is believed to be Mississippian-Madison. If this is true it means that three formations in the Williston basin have shown for commercial oil: The Devonian at Amerada 1 Iverson, the Mississippian-Charles (?) at Shell Oil Co. 1 Northern Pacific in eastern Montana, and the Madison in Amerada 1 Bakken.

Amerada's initial discovery well, in 6-115n-95w, is producing through perforations at 10,490-10,530 ft. This well is making about 200 bbl. during the 12 hours that it is open each day. Further details on these and other Williston basin wells will be found in the exploration section under Rocky Mountains.

Industry Briefs

LOS ANGELES.—A major refinery construction program is planned by Richfield Oil Corp. for its 100,000-bbl. Watson refinery in the Los Angeles Harbor area. Reports have it that the program will include a large cat cracker and feed-preparation unit. Richfield recently acquired a large tract of land adjacent to the Watson plant for future expansion.

HOUSTON. — American Republics Corp.'s oil terminal here may be sold to Hess, Inc., a Perth Amboy, N. J., organization. Property consists of two oil docks, storage tanks, and facilities for handling crude and products. Sale price was reported to be $3,500,000. American said that the sale should be completed by September 15, if the deal goes through.

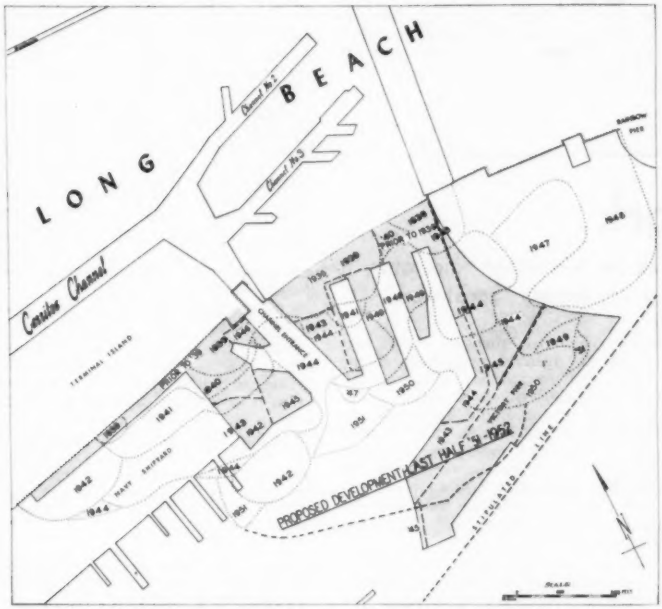
COLUMBUS. — Drilling Research, Inc., has initiated a study of drilling methods at Battelle Institute here in an effort to find a revolutionary technique that will reduce high drilling costs. Dr. J. V. Pennington, technical director of Drilling Research, said the organization had instructed Battelle to disregard all known drilling methods and "delve into the unconventional and the impossible." He said that under present conditions vast reserves of marginal production potential could not be drilled, and higher prices for petroleum products are inevitable.

WASHINGTON.—Chairman Walter S. Hallanan has scheduled the next meeting of the National Petroleum Council for October 31. Hallanan, who urged all members to attend, said committees are slated to prepare reports for presentation at this meeting on studies of oil and gas availability, the 1,000,000-bbl. expansion in output of products, liquefied-petroleum gas, quebracho requirements, synthetic costs, petroleum-truck transportation, trends in petroleum-consuming equipment, and underground storage for petroleum.

LOS ANGELES.—Southern California Gas Co. will build a $1,750,000, six-story building here to house various company operating departments. The new structure, recently approved by Petroleum Administration for Defense, will adjoin the company's main offices, and construction will start as soon as an existing two-story building on the site can be demolished.

MIDLAND, Tex.—British-American Oil Producing Co. and Cabot Carbon Co. have purchased a 480-acre lease in the Spraberry trend area of Midland and Glasscock counties in West Texas from R. D. Buckley, St. Louis. Buckley also received a 1/16 override from seven-eighths of oil produced, and the assurance that a Spraberry-objective well would be started within 60 days.

WASHINGTON.—Ceiling prices that are lower than world prices are encouraging foreign operators to purchase more tubular goods in the United States and the Petroleum Administration is seeking to halt the practice. PAD officials said that in the past companies operating abroad have purchased much of their tubular goods from overseas mills, but since the imposition of ceiling prices have been buying more here and shipping it out. Such purchases tend to reduce the supply of tubular goods for programed purposes, and PAD is insisting that the companies continue to buy abroad to at least the same extent as they have done historically.



***WILMINGTON FIELD GROWTH.**—Growth of the tidelands portion of Wilmington field, California, from 1939 to date, and the area to be developed in the immediate future is shown on the above map, as is rate of development of city tideland oil properties north of the "stipulated" line from 1939 to date.*

Oil-Drainage Question

Long Beach Harbor operations are getting too close to tidelands reserve area, Justice Department charges

D. H. Stormont

LONG BEACH.—Is oil drainage taking place from San Pedro Bay tidelands which have not been developed because of lack of clear title as to whether they are city or federally owned?

The Department of Justice believes that such is the case; it has charged the Long Beach Harbor Department with permitting its contractors (Long Beach Oil Development Co. and Richfield Oil Corp.) to drill too close to these underwater reserves. Furthermore, through a representative of the U. S. Geological Survey, the government agency has asked that money received for this drained oil be impounded until the title situation is cleared.

The record of how the Harbor Board has proceeded with the development of the tideland portion of the field does not indicate the stipulated line is being rushed or violated.

Such definitely is not the case in the three deeper zones of the seven-pay Wilmington field. The pools being developed in these zones, Ford, U.P., and 237, do not extend as far out as the "stipulated line"—the temporary boundary agreed upon in 1947 by the U. S. Government and California landward of which the city of Long Beach was given title. At their nearest points the limits of the three pools are 800 to 2,500 ft. landward of the line.

Drainage possible.—In some of the upper zones drainage is regarded as possible, but not probable, by engineers of the Harbor Department. This is because: (1) Development has been kept more than 400 ft. away from the contested area; (2) the crudes involved largely are of low gravity and mobility; and (3) transverse faults probably exist in the zones beyond the stipulated line just as they do in the harbor area.

In substantiating its claims that the stipulated line is not being rushed, the Harbor Board points out that all drilling scheduled for the remainder of this year and in 1952 is planned on the basis of bottoming new wells at least 400 ft. from the line. Since all wells near the boundary will be slanted from Terminal Island, the setback at the midpoint of the zone will be in the order of 800 ft. The planned wells, bottomed in either the Tar or Ranger zones, thus are not expected to result in any appreciable drainage.

Growth of a giant.—Just how the harbor area of Wilmington field has been developed, and fills provided from which drilling could take place, are shown in the accompanying map.

One point of particular interest, with respect to the present controversy, is the fact that development of the Ranger zone reached its present southern limit in late 1945. This was 2 years before the city's title to the oil reserves inside the 3-mile limit was questioned in the courts.

Last year when a competitive situation developed in the drilling of the upper Terminal zone, two extreme-edge wells were completed. While both wells were bottomed about 400 ft. from the stipulated line, only the K sand of the zone was opened to production. Productive limits of the other six sands in this zone were considerably landward of the bottom-hole locations of these wells. Harbor Department engineers consider it very doubtful if any commercial production ever existed in the K sand beyond the stipulated line, as far as developed pools are concerned.

What upper and lower Terminal production, if any, exists east of the southerly prolongation of Pine Avenue (east boundary of Parcel A) is not known. If the zone is productive that far east, it would seem certain that it is beyond the radius of drainage of existing wells, and is probably separated from developed pools by transverse faults which constitute barriers to drainage.

Pier A fill.—The 1950 Pier A fill is being utilized as drill sites for a program of Tar and Ranger zone wells, with both zones being developed on 10-acre spacing. On the east edge of the pier Richfield Oil Corp. is completing the development of Parcel A in accordance with the 400-ft.-setback rule. Westward on the pier L.B.O.D. is just getting under way on a program of developing the area. In both developments it is believed no appreciable drainage will be caused from portions of the Tar and Ranger zones lying seaward of the stipulated line, for the reasons earlier brought out.

Harbor Department engineers point out that this program should have been completed no later than December 1945.

Principal reasons for this lag has

been a shortage of drill sites and competitive drilling conditions which existed from time to time in the deeper, lighter-gravity zones. Another factor has been the necessity for redrilling earthquake-damaged wells. Of the 11 rigs at work on city tideland properties, during the last half of 1950 and the first quarter of this year, only 5 were at work on new wells.

(Details of development problems in the San Pedro Bay area were described in the September 6, 1951, issue of The Oil and Gas Journal, on page 58.)

TECHNOLOGY

"Brain" at Work

Magnolia finds added chores for electronic calculator; says potential for oil-industry use barely "scratched"

Carl Hoot

DALLAS.—The electronic brain has found many applications in the oil industry, but the surface of its potential is hardly scratched, according to researchers of a major company.

Magnolia Petroleum Co. has geared its electronic calculators, or "brains," and their "memory" units, to automatic printing machines to handle a large percentage of its everyday tabulating problems.

Outlook for the device is of greater importance. Magnolia's extensive research laboratories are finding ways of applying its high-speed calculation to the compilation of data for solving the unknown in problems pertaining to reservoir analysis.

No wheels.—The true electronic calculator has no moving parts, no gears to mesh, no wheels to turn. The International Business Machines Co. Model 604, of which Magnolia has two, is made up of 1,535 vacuum tubes. Its work is accomplished by power impulses, with tubes turning on and off at the rate of 50,000 times per second.

Problems to be solved are introduced into the machine via key-punch cards which run through at the rate of 100 per minute, regardless of the complexity or number of mathematical equations involved. Special calculations are handled by using removable panels which are "wired" for that type operation. Answers from the calculator are returned on punched cards which in turn are fed into automatic printing machines capable of running off 150 lines per minute.

A year or two ago these machines were treated as an oddity of science and their application to industry had not been realized to any degree. At this time their demand is such that they are coming off regular assembly lines of such companies as IBM, Eckert-Mauchley division of Remington Rand, General Electric Co., and Radio Corporation of America.

Oil application.—That electronic calculators save tremendous numbers of man-hours in research work involving thousands of mathematical equations is more or less common knowledge, but application of the machines to problems common to oil companies is relatively new and of prime interest at this time.

Such applications have no prior knowledge to work on. Problems concerned with standard bookkeeping, the makeup of monthly statements or record cards is routine, but formulas for problems involving reservoir data, geological contour maps, research, and similar work is being developed—and highly guarded by individual companies.

Magnolia believes it has pioneered in applying the electronic machines to problems common to oil operators. The company not only uses the calculators for all product-purchase and sales records but has worked out formulas for handling casing-head gas-measurement charts and the complex oil and gas royalty and tax payments which plague every producing company.

An oil lease may have few producing wells, but records show the number of lease owners has reached 650 in one extreme case. Magnitude of that particular problem is apparent when it is realized that payments to royalty owners must take into consideration such factors as gravity of the oil and its price scale, gross-production tax, and basic sediment in the lease tanks. These factors are applied to the owner or owners' interest in the lease.

Royalty payments.—Application of the electronic calculator to the royalty-payment problem is rather involved, but when set up, the machine turns them out on production-line schedule. Simplified somewhat, the procedure is as follows:

From the original gage ticket is taken the amount, gravity, and temperature of the oil. Basic sediment and water percentage is also figured. A card is punched with these data and sent through the calculator, which picks up the number of barrels produced, applies a coefficient from the memory unit to find the volume of oil at 60° F., reads that number of barrels and makes an adjustment that takes into consideration the b.s. and w., and punches its answer on the card.

These cards are then placed with price cards and run through the machine a second time. The machine can then read the final adjusted-barrel figure which it had previously calculated, multiply that by the price per barrel, and punch the total value on the card.

Memory unit.—One of the most interesting phases of electronic calculating is the so-called memory or storage unit. This contraption is attached to the electronic calculator and holds in storage, or "remembers" all the various factors and constants applying to a certain lease.

Thus, if a lease comprised 100 owners, each owner would be credited with the same percentage of b.s. and w., the same purchase price of the oil, gravity, etc. By retaining all calculations or charges made against

A. C. Buchanan, Jr., at controls of one of the model 604 IBM electronic "brains." Case directly behind Buchanan contains removable panels, which have been "wired" much like a switchboard to handle various types of calculations.

each oil lease, the storage unit, when all owners' cards have been run and figured, will total up all charges made against that particular lease. This information is transferred to a separate card, and provides a balance sheet of operations for that one lease.

No set rules.—As pointed out, use of the electronic calculator is strictly an individual problem of adaptation. Accounting calculations, statistical studies, and research data which have been needed by top management of all companies for efficient direction of operations, but heretofore economically impossible to obtain, are now within reach, due to the tremendous speed of the "brain."

Depletion schedules of leasehold costs, involving the calculation of two amounts, comparing the result and selecting the smaller; in turn comparing this selected amount with another, selecting the larger and recording the answer, is only one example of the almost human judgment which the machine is capable of performing at the rate of 100 leases per minute.

When this type of work is done manually it leaves the employe doing the job in a condition where he begins to wonder which came first, the chicken or the egg. The electronic calculator, of course, is not extended at all on this operation.

Research calculations have been encountered at Magnolia which have required 1,600 hours' time of a trained engineer using a good automatic desk calculator of conventional design, but when applied to the 1,535-tube machine are completed and the solutions recorded in 7 hours.

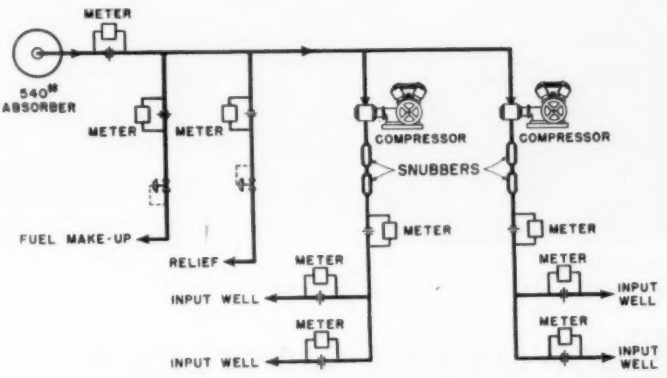
These problems, and countless others, must of necessity be worked out by each user of the calculator, since the machine is comparatively new and the companies manufacturing this type of equipment have not begun to explore all its possibilities.

Constant studies to discover faster and better ways of utilizing this new tool are being carried out at Magnolia in the controller's department by L. E. Frensley, controller, and W. M. Albert, head of that department's systems and procedure section, and also at the field research laboratories by Dr. J. S. Aronofsky.

Organization.—Magnolia organized its tabulating department 25 years ago and its first job was in marketing analysis. Since then it has grown to 50 employes and 71 machines and handles records and problems from all but two of the company's departments. The 14 different type machines handle 24,000,000 cards a year.

Heading Magnolia's tabulating department is A. C. Buchanan, Jr., who supervises the various machines, directs activities of 30 girls and 20 men who run the machines, works out wiring diagrams for the electronic calculators, devises card-filing systems and printing schedules, and in his spare time attends IBM's and the various eastern conventions designed to keep operators up to date on the ever-changing procedure of operations.

Buchanan's background is ideally suited to encompass the situation presented by acquiring one of the new wonders of the electronic world. His hobby is radio and power electronics. He is an operator of an UHF radio station in Dallas and holds a degree in radio engineering from Southern Methodist University.



SNUBBER INSTALLATION.—This diagram shows how snubbers were installed on natural-gas lead lines to gas-input wells on pressure-maintenance project, which solved pulsating metering situation.

Effective Snubbers

They solve tough metering problem on input lines

DALLAS.—A novel snubber installation which solved a pulsating metering situation in natural-gas lines leading to input wells used for pressure-maintenance purposes is the result of the increased use of the equipment for gas-surge control in the petroleum and petrochemical industries.

The installation of tandem snubbers did away with erratic pulsation at the meters and permitted accurate accounting of the total amount of gas placed into the input wells with the amount of gas flowing from a 540-lb. absorber.

In the original installation, gas flowed from the absorber to two compressors, which injected the gas into the four input wells. A meter was installed at the outlet side of the absorber, and a meter was installed at the head of each of the four input wells. The sum of the input-meter volumes on the discharge of both sets of compressors to the volume of gas passing to the compressors varied as much as 35 per cent (input meters nearly always low).

It was decided to install master meters on the discharge of both compressors to compare the master-meter volume of each discharge line with the total of the input-well meters on each line.

It was recognized that the proposed master meters would have pulsations from the compressors, 200 ft. away, and it was deemed desirable to install snubbers ahead of the master meters.

Tandem snubbers used.—Tandem snubbers were installed in each line between the compressors and master meters. It was found that the snubbers prevented considerable pulsation on the charts, and the master meters checked with the sum of the input-well meters.

Other results noted were: That daily checks of either master meter with the sum of the respective input-well meters gives an immediate indication of any leakage developing in the system; and that pulsations from the suction side of the compressors can also affect measurement on the relief, fuel make-up, and master meter on the 500-lb. absorber.

The gas and air-line snubber development evolved from investigations of means to reduce the pulsing of gas in a pipe or column open to atmosphere and driven by reciprocating or rotary machines, the pulsing or surging resulting in noise at atmosphere.

The device has been modified for application to closed systems handling compressible fluids under a wide range of pressures. Snubbers are designed in a series of stages to progressively damp out free oscillation.

The installation reported here was made by Burgess-Manning Co., Dallas.

WILLAMAR PLANT.—This is an aerial view of the Willamar West pressure-maintenance plant which was recently dedicated in Willacy County, Texas. The plant has an initial capacity of 33,000 M.c.f. daily, and an ultimate daily capacity of 58,000 M.c.f.

Plant Begins Operation

Big pressure-maintenance project now under way in Willamar West field following official dedication

F. Lawrence Resen

CORPUS CHRISTI.—The new 6,850-hp. pressure-maintenance plant at Willamar West field in Willacy County, about 100 miles south of here, is now in operation, following formal dedication by the Pan American Production Co., plant operator, and 12 other operators who joined in unitization of the reservoir which became effective August 1.

E. R. Turner, Houston, Pan American president, acted as host and master of ceremonies. Some 300 persons were present including representatives of the participating companies and many of the land and royalty owners in the unitized area.

Six compressors give the plant an initial capacity of 33,000 M.c.f. of gas per day. Three injection wells, and a fourth being conditioned, are used to return the gas to the gas cap associated with the 7,800-ft. Frio sand, chief oil-producing reservoir.

Technical details.—An ultimate plant compressor capacity of 58,000 M.c.f. per day was used as the basic design in laying out the plant and gathering system.

Six four-stage compressors provide 6,850 hp. Five of the compressors are 1,100-hp. units and the sixth has been supercharged to 1,350 hp. All compressor cylinders on the five 1,100-hp. units are sized and clearanced so that the engines may be later supercharged in the field without having to change cylinder sizes. The compressor horsepower available under full supercharged conditions will total 8,100.

Gathering system.—A dual gas-gathering system is used to receive gas from the field at pressures of 50 and 300 psia. This gas is compressed to the injection pressure of 3,000 lb. An interstage pressure of 900 lb. provides for gas-lift service in the field.

A special feature of the plant is that all cooling units, including all interstage gas and lube oil, are air cooled. It is believed that this is the first plant of this type having its entire cooling system air cooled. The electric motor-driven fin-type gas coolers were sized for the ultimate plant gas load on the basis of 20° F. approach to ambient air.

Electric power.—All mechanical auxiliaries in the plant are electrically driven. Electrical power is furnished by three 250 kva., 480-volt, three-phase, 60-cycle, 400-r.p.m. generators direct-connected to 303-b.hp. four-cycle engines.

Controls are provided to make the plant as completely automatic as possible. Complete temperature, pressure, and volume instruments are provided for various plant operating conditions. Gas scrubbers are provided with automatic liquid-dump controls. For safety, the plant is equipped with automatic combined pneumatic and electric engine shutdown facilities which ground the engine magnetos as well as vent the fuel lines.

O. L. Olsen Co., Houston, designed and constructed the pressure-maintenance plant's gas-gathering and injection systems.

Field background.—Discovery well in Willamar field, completed November 14, 1940, was Willamar Community Well No. 1, drilled by Pan American for the joint account of themselves, Standard Oil Co. of Texas, and Shell Oil Co. Continued development through the years has resulted in a total of 254 wells drilled which have produced slightly over 21,000,000 bbl.

A study of the producing horizons in the Frio sands at depths varying from 7,600 ft. to 8,000 ft., was begun in April 1945. Results of the study indicated that actually three reservoirs were being produced in the area: West reservoir, the Graben, and the East reservoir. In September 1947, it was concluded that pressure maintenance applied to the West reservoir would prolong its life, increases its ultimate recovery by an estimated 5 per cent and eliminate the flaring of casing-head gas.

The Willamar flare-gas order, issued by the Texas Railroad Commission on August 21, 1950, became effective prior to the completion of unitization proceedings and temporary measures were used to conserve the flare gas.

Temporary operations.—With the permission of the Railroad Commission a 1,100-hp. compressor, provided by Humble, was installed in the field and used to store flare gas in shallow, nonassociated sands. Pan American and associates used 3 Hodge to return gas to the 3,900-ft. sand, and Humble utilized 33 El Sauz Ranch to return gas to the 4,500-ft. reservoir.

Because of the limited capacity of the compressor the field was placed on a 12 producing days per month allowable and part of the field's oil-

gathering system was made to perform double duty. The oil-gathering lines were periodically and alternately converted to gas gathering and the temporary setup performed effectively until the pressure-maintenance plant was completed and the full producing schedule restored.

In Willamar West reservoir, 158 wells have been completed. Pan American is using two wells as injection wells in the unitized block and is presently conditioning a third well for injection purposes. Humble injects gas into its section of the reservoir through one injection well.

Participants in the ownership of the plant are in addition to Pan American, Humble Oil & Refining Co., The Chicago Corp., Shell Oil Co., Standard Oil Co. of Texas, Sun Oil Co., G. F. Bauerdorf, David C. Bintliff, City National Bank of Houston, Trustee, C. H. Lyons, C. R. Nichols, K. D. Owen, W. P. Prentiss, and J. B. Stoddard et al. All of the participants, with the exception of Humble, are members of the unitization agreement.

AT DEDICATION.—Olin Culberson, chairman, Texas Railroad Commission, speaks at dedication ceremonies of Willamar West pressure-maintenance plant. On extreme left in background is Pan American Producion Co.'s vice president, John Vetter. In foreground are O. L. Olsen, Houston contractor, and E. R. Turner, Pan American president, and on Culberson's left are Judge Gill, W. J. Murray, Jr., railroad commissioner, E. V. Hewitt, Pan American general superintendent, and D. A. Davidson, Jr., district superintendent.

NATIONAL AFFAIRS

Steel Priorities

PAD outlines new specifications for obtaining tubular goods, cites difficulty in allocating supply available

WASHINGTON. — New specifications for obtaining priorities for oil-country tubular goods were outlined to representatives of 14 industry associations last week by officials of the production division of the Petroleum Administration.

Complementing that meeting was another between officials of the materials division and representatives of the steel industry at which the possibilities of stepping up the production of tubular goods was canvassed.

The producers' meeting was opened by Deputy Administrator Bruce K. Brown who outlined the cold, hard facts of the steel situation, explaining that drilling proposals would require three times as much steel as is available to the industry. PAD, therefore, he said, has the job of dividing that steel in such a way as to maintain all-out drilling of wildcats, encourage the development of new fields without which steel used in wildcat drilling would be a loss, provide for the continued development of established fields, and keep established operators in business.

Production division officials, surprised at the number of operators who did not know what information was required on the various forms used in PAD procedure nor the necessity for supplying in full the information called for, spent considerable time explaining the why and how of the allocation system and answering questions as to its application in specific instances.

Suggestions made. — A few suggestions for improvement were made by the producers, but on the whole the group appeared to feel that the system was working pretty well and would work better as the kinks were ironed out through better understanding on the part of operators.

Deadline September 30

WASHINGTON. — Bruce K. Brown, deputy petroleum administrator, has reported that deadline for applications for tubular goods to be delivered during the first quarter of 1952 is September 30. Operators must file on Form PAD-17, together with an inventory report on Form PAD-16.

Operators who drilled 40 wells or less during the preceding four quarters must file reports on Form PAD-32, showing wells completed during the third quarter, 1951, and how casing and tubing allotted by PAD were used.

It was agreed that on the basis of the information made available and the changes to be made in the specifications, the operators would watch the situation and return in 3 months to review their experience.

Meanwhile, informal discussions between steel representatives and materials division officials developed that there is mill room for a substantial increase in tubular goods production.

PAD officials are aiming at all-out production during the first two quarters of next year in production sizes of tubular goods, vitally necessary, they said, if the expansion program is to be carried through. There is a belief in PAD that the necessary steel for the increased output can be secured from the National Production Authority if it can be shown it can be consumed by the mills.

Structural steel.—Meanwhile, it was announced in Washington by the Defense Production Administration that the oil and gas industry will get only 59 per cent of the structural steel estimated by PAD to be required during the fourth quarter—60,000 tons against a requested 102,123 tons.

But only 6 of the 13 claimant agencies will get a greater percentage of their requests: The Atomic Energy Commission, 100 per cent; Defense Electric Power Administration, 75 per cent; Maritime Administration, 76 per cent; Defense Department, 94 per cent; Secretary of the Army, 90 per cent; and Canada, 77 per cent. The claimant agencies, which sought an aggregate of more than 1,230,000 tons, received a total of 737,757 tons.

Demand too high.—Announcing the figures, the Defense Production Ad-

ministration explained that fourth-quarter demand for structural steel proved to be 223 per cent of what would be available. Accordingly, while direct military requirements and expansion of aluminum production were given 100 per cent of their screened requirements, there was only 51 per cent of estimated needs left for the steel expansion program, 26 per cent for other industrial expansion programs, and 11 per cent for general commercial construction.

DPA is now preparing to work on applications for the first quarter of 1952 and has told applicants who were denied steel for the fourth quarter to reapply for material to complete projects already under way, but there is no indication that it will be able to make any substantial increases in allotments at the start of the year.

Export Price Check

OPS to delve into prices paid on fuel-oil exports

WASHINGTON. — An investigation of the prices received and paid for fuel oil exported from East Coast points has been instituted by the Office of Price Stabilization.

Basic purpose of the inquiry is to determine whether violations of ceiling prices are on a scale which might affect domestic supplies of heating oil next winter.

OPS officials explained that they have reports indicating that some East Coast suppliers whose prices were frozen under the general ceiling-price regulation and who were not, at that time, selling for export have, since mid-June been offering and delivering products for shipment abroad.

Many of these newcomers into the export market, it was said, are independent jobbers whose operations heretofore have been limited to furnishing fuel oil to domestic consumers in New York and New England.

Under the price regulations, it was explained, a supplier desiring to sell petroleum products for export must make application for a ceiling price for such sales if no ceiling had been previously established. Apparently, some present exports are being made without compliance with that requirement.

Prevents drain.—OPS emphasized that the policy of establishing equivalent prices for domestic and export sales of products is designed to prevent a drain from the United States at the expense of domestic consumers. The present export situation, if allowed to continue, may mean a shortening of supply in some areas along the Atlantic seaboard, officials said.

If oil now moving abroad can be retained in this country, it was pointed out, it might not be necessary to increase ceiling prices on domestic sales

WATCHING WASHINGTON

Bertram F. Linz

Shoestring Wears Thin

Ever since it was set up the Petroleum Administration for Defense has been operating on a financial shoestring, and the shoestring now is threatening to snap.

For the fiscal year which began July 1, PAD secured budget-bureau approval of a $3,170,000 operating fund. That money would have permitted an increase in the staff from the present 268 persons in Washington and 4 in the field to 412 in Washington and 36 in the field. In addition, the agency would continue to have 20 officials serving without compensation.

Most of the reinforcements wanted by Deputy Administrator Bruce K. Brown would be in the materials and supply and transportation divisions, which will be the hot spots next winter when product shortages pop up here and there.

The PAD fund was included in an appropriation bill which came out of the House appropriations committee badly mangled. The $3,170,000 was cut to $2,400,000—approximately $200,000 less than the agency's present rate of spending.

The worst was yet to come, however, and did come when a tired House in night session simply eliminated all funds for all emergency agencies and ordered that they be supported by the departments in which they are lodged. This is expected to work extreme hardships on the Interior Department as well as all its agencies.

The bill is now being studied by the Senate appropriation committee to which Chapman, Brown, and other officials have appealed for relief.

Canada Interested Too

Canadian oil interests are expected to watch closely the negotiation of the new reciprocal trade agreement with Venezuela because any change in the present import quota might be of considerable importance next spring, when several refineries in the Great Lakes area are expected to come into the market for oil moving through Interprovincial's pipe line and by tankers.

Venezuela is believed to be aiming at elimination of the quota system—a development highly desirable from the Canadian viewpoint as well.

As it stands now, Canada cannot get a quota of its own because it lacks a "historic" basis on which to figure one. She would have to vie with the Middle East, Colombia, and all other countries, which have no individual quotas.

Present import quotas are 59.4 per cent for Venezuela, 18.7 per cent for the Netherlands, and 21.9 per cent for all other countries. The 21.9 per cent this year amounted to 963,429,333 gal. which was filled before the end of May.

Something for Nothing

Pressure apparently is being brought to bear on Interior Department officials to act on claims for lands in the submerged areas off the coast of Texas, Louisiana, and California. The claims are backed up by land scrip issued by the Government nearly a century ago.

A number of these have been filed since the Department of Justice first expressed the Government's claims to the tidelands. They are based on certificates issued to war veterans and others which entitle the holders to acreage in the public lands. There were several such issues, all but one of which appear to have been good only for nonmineral lands.

Considerable tidelands acreage is sought under the scrip and in most instances claims are spotted where oil is now being produced. Companies producing oil are more than a little concerned, even though there appears to be little or no grounds on which the department could take their holdings away from them.

The scrip was issued to encourage settlement upon the then-wild public lands, and there is some question whether it would be valid for other than homesteading purposes. Again, the Department of Justice has held and the Interior Department has agreed that the tidelands are not public lands in the sense the term is used in the Mineral Leasing Act.

More to the point, perhaps, is the fact that even if the department approved the claims, the question would naturally be carried to the courts, which in the past have taken a very reserved position with respect to scrip claims.

It is generally believed that the department will reject the claims, particularly since the question of tidelands ownership is still pending in Congress and the department would have a bear by the tail if the lands were returned to the states.

as has been requested by independent jobbers in the area as a means of increasing the supply.

The price agency instituted its probe of compliance when it was found that independent jobbers who ordinarily sell mainly to domestic consumers supplied 2,373,500 bbl., or approximately 92 per cent of the 2,633,500 bbl. of No. 2 and gas oil exported from North Atlantic ports since the middle of last June.

Synthetics Support

DPA asks for elaboration of Interior Department scheme to guarantee market prices for coal-hydrogenated fuels

WASHINGTON. — Interior Department plans for establishment of a synthetic - liquid - fuels industry based on coal are still highly indefinite and proposals for the construction of the first such plant are still in a tentative stage.

Department officials, however, contend that government support of synthetic-fuel plants is justified by their relation to national defense, even in the face of a cost of $400,000,000 or more and requirements of 200,000 tons of steel for a 30,000 bbl. per day coal-hydrogenation plant.

Considerable information regarding the widely discussed proposal to build a plant in Illinois has been disclosed by the department in response to a request by Sen. Robert S. Kerr of Oklahoma. The department also has been asked by Defense Production Administrator Manly Fleischmann to furnish details of the proposed operation to support Interior Secretary Oscar L. Chapman's request for authorization to borrow $455,000,000 from the Treasury for the purpose.

Fleischmann reportedly has asked the department to furnish figures on comparative costs of fuels from petroleum, coal, and shale and a mass of data which probably cannot now be developed.

In a lengthy letter to Kerr, Assistant Secretary of the Interior Robert R. Rose, Jr., disclosed that the department holds to its view that "the limited nature of domestic petroleum reserves, together with growing uncertainty as to availability of foreign oil under emergency conditions, dictates immediate exploitation of oil shale and coal deposits."

No decision has been made to erect a synthetic liquid fuels plant in Illinois or elsewhere, Rose explained, but the authority to borrow was requested to establish a basis for negotiating purchase contracts. The government would not finance the construction of the plant, and the money borrowed would be set aside to cover its liability under contracts to purchase output.

Colchem interested.—Rose told Kerr that F. Eberstadt & Co., through the Colchem Corp. in which they are interested, have made tentative and conditional proposals based on the premise that the money for construction and operation will be obtained from private sources, with the government to enter into a procurement contract guaranteeing the current market price for its products.

Koppers Co. has been retained by Colchem as a consulting firm to handle the engineering phase of the proposals and it is indicated that this company, in conjunction with other engineering firms, would build the proposed plant.

Steel needs. — Discussing the steel needs for such a plant, Rose admitted it would be in the neighborhood of 200,000 tons for a 30,000 bbl. per day production but contended that "these initial steel requirements are no higher than would be needed to produce the same products from other sources.

"Coal hydrogenation," he said, "produces substantial quantities of vital chemicals as well as high-grade fuels, and about the same amount of steel would be required to build facilities for making equivalent high-grade products from petroleum, including steel for crude exploration and development, as for coal hydrogenation."

Rose asserted that on the basis of sustained production over a period of years, steel requirements for coal hydrogenation are less than for petroleum. "For example," he said, "coal hydrogenation including the coal mining requires approximately 2.8 lb. of steel for each barrel of product made, whereas for petroleum including crude production as well as refining, approximately 4.6 lb. of steel are required per barrel of product."

Demonstration successful. — The hydrogenation process developed at the department's Louisiana, Mo., demonstration plant has proved successful, the assistant secretary said, and reports on synthetic fuel by the Ordnance Corps state that it is "eminently satisfactory in every respect."

"Cost estimates based on actual operation of this demonstration plant indicate that commercial coal-hydrogenation plants producing chemicals as well as fuels are economically feasible," Rose declared. "It should be noted, however, that the expected profits are not as large as normally realized by industry at large, including the petroleum industry."

Coal hydrogenation yields about 2 bbl. of liquid products from each ton of coal, including that which is burned to generate power and steam for operating the plant. On the basis of coal actually processed, about 4 bbl. can be made from each ton, according to department calculations.

Rose said that surveys indicate recoverable coal deposits in Illinois, suitable for conversion, are equivalent to 34 billion barrels of synthetic-liquid fuels, a quantity which "is substantially larger than our domestic proved crude-oil reserves of 25 million barrels." Oklahoma, he told Kerr, has coal reserves from which less than 2 billion barrels of oil could be produced, according to Army Engineer Corps estimates.

Defense Orders Issued

WASHINGTON.—The following orders have been issued by the National Production Authority:

M-82, August 31: Regulating the movement of brass mill products to distributors.

Direction 4 to M-11, August 31: Ordering producers of copper controlled materials to fill only authorized controlled-material orders after October 1.

Amendment to M-46A, September 5: Reducing the number of allotment symbols and DO ratings for foreign petroleum operations.

Amendments to Dir. 3 to M-1, Dir. 1 to M-5 and Dir. 2 to M-11, September 5: Providing a priority for authorized controlled material orders of non-military branches of the Army.

M-84, September 7: Providing for the supply of aluminum for "destructive" purposes in chemical plants, steel, and certain other mills.

MEETINGS

A.S.M.E. Program Set

Program arrangements for the sixth annual petroleum - mechanical engineering conference September 24-26 at the Mayo Hotel in Tulsa are complete.

The conference, sponsored by the American Society of Mechanical Engineers, will be primarily devoted this year to conservation of manpower and materials.

Technical papers scheduled for presentation during the 3-day convention dwell on operations in every branch of the oil industry.

They are grouped under sessions on pumping equipment, liquid measurement, pilot plants, drilling, corrosion, offshore drilling, pipe-line engines, instrumentation, equipment, operations, design, materials, pumping, pipe-line control, and equipment selection.

A panel discussion on welding practices and experiences with high-yield-point pipe is scheduled for the morning session on September 25.

LAGUNILLAS FIELD.—This aerial view of Lagunillas field on Lake Maracaibo, in Venezuela, shows shore installations of Creole, Shell, and Mene Grande. Wells of the three firms can be seen on both land and offshore.

LATIN AMERICA

Oil Congress Meets

Delegates to Venezuelan National Petroleum Convention told of country's major role in supplying world markets

Oscar B. Irizarry

CARACAS, Venezuela.—Venezuela's oil industry is engaged in a large expansion program, and the government is proud to declare that the country's oil will continue to contribute in the measure that might be necessary to help in the struggle to preserve western civilization, Dr. Santiago E. Vera, Minister of Mines and Hydrocarbons, told delegates to the first National Petroleum Convention here this week.

Dr. Vera added that this expansion program will be carried out, assuring private capital a profit which will serve as an inducement to investment.

"The government will make an effort to attract more companies to Venezuela," Vera reported. "It is necessary that within the oil industry itself a greater diversification of investors be attracted to collaborate in further developments. This will not only be advantageous to the interests of the nation, but also to those of the companies."

Dr. Vera delivered the inaugural address before an auditorium overcrowded with oil operators from Venezuela and abroad. However, official delegations, consisting of 180 representatives of local oil companies and Venezuelan Government agencies, and 160 observers from foreign nations, were assigned reserved seats.

Dr. Oscar B. Irizarry, editor of Petroleo Interamericano, Latin-American oil-publication affiliate of The Oil and Gas Journal, is now in Caracas where he is attending the first Venezuelan National Petroleum Convention as a representative for the two magazines.

All Latin American oil-producing countries are represented except Argentina.

Among directors of the petroleum congress are Dr. Vera, minister of mines and hydrocarbons; and Gustavo Thery Fombona, director of the National Petroleum Bureau.

Vera presides.—Dr. Vera and other government officials are presiding over the general sessions, but various company men are leading the technical discussions.

An unusual feature of the convention is that all material presented at the sessions has been coordinated into an illustrated volume of more than 400 pages, printed in both Spanish and English editions. A second volume, a detailed analysis of Venezuelan crude oils prepared by Prof. W. L. Nelson of the University of Tulsa and technical editor of The Oil and Gas Journal, has been given to all those attending.

Sessions are being held on the campus of Andres Bello College here. Two days of the convention were devoted to a visit of the Lake Maracaibo oil fields and refineries on the Paraguana Peninsula.

Delegates present.—The United States is represented by Oscar L. Chapman, Secretary of the Interior; Bruce K. Brown, Deputy Petroleum Administrator; and C. Stribling Snodgrass, of the Petroleum Administration for Defense. Other representatives include: From Iran, Prince M. Farman Farmaian, official of the Iranian Ministry of Finance, and Mohammad Jawad Khalili, director of the Petroleum Department under the Ministry of Finance; from Egypt, Dr. Mahamood Abozeid, director general of mines, and Senator Abdelsalaam A. Osman, director of Anglo Egyptian Oilfields, Ltd.; Great Britain, J. A. Beckett, petroleum attache of the Embassy in Washington; and the Netherlands, P. Schierbeek, director of mines.

Geological highlights.—A geological review of Venezuela was outlined in a paper presented by E. Mencher, Socony-Vacuum Oil Co., Inc.; H. L. Fichter and H. H. Renz, Shell Caribbean Petroleum Co.; W. E. Wallis, Creole Petroleum Corp.; J. M. Patterson, Texas Petroleum Co.; and R. H. Robie, Venezuelan Atlantic Refining Co. The authors pointed out how the varied geology has given rise to a number of physiographic provinces which have been classified by Liddle. These are the Guayana highlands, Venezuelan Andes of the states of Tachira, Merida, and Trujillo, Sierra de Perija, Cordillera de la Costa, Llanos, Maracaibo Lake basin, Falcon region, Delta region, and Islands of the Caribbean. Geological aspects of each of these various areas, together with their productive possibilities, were discussed.

Exploration.—The trend in Venezuela, as well as in most other oil-producing countries, is toward deeper drilling. B. N. Moore, Sinclair Oil & Refining Co.; L. W. Henry, Richmond Exploration Co.; D. B. Williams, Shell Caribbean Petroleum Co.; D. C. Porterfield, Creole Petroleum Corp.; T. A. Kibby, Mene Grande Oil Co.; together with N. P. Teague, Robert H. Ray Co.; R. H.

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The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

DR. VERA

G. FOMBONA

Mansfield, Sinclair Oil & Refining Co.; and J. E. Dorris, Seismograph Corp. of Delaware, pointed out in a paper on highlights of exploration activity in Venezuela that the most important oil discovery in the country in many years was made in 1944. This was production found in Cretaceous limestones underlying the shallower producing sands in the old La Paz field west of Maracaibo. This discovery, the authors stated, converted La Paz field into the second-largest field in the country.

The Lake Maracaibo area, which yielded a 100,000-bbl. per day well that marked the beginning of the real search for oil in Venezuela, was dealt with at length by the authors, who discussed various operational and production problems encountered in the region. They also pointed out the increasing use of all geophysical methods throughout the country in the quest for more oil.

Field development. — Optimum gross oil production at optimum rates for a profit from their respective operations is the primary purpose of oil operators in Venezuela as well as in other countries. Operators are constantly, either individually or collectively, developing their holdings under programs which will result in this goal.

Their programs naturally are governed by factors which are physical, economic, and competitive, which are closely interrelated, and which change frequently in relative importance.

In a paper presented by Kenneth S. Fricke, Texas Petroleum Co.; Robert W. Beck, Creole Petroleum Corp.; L. L. McWilliams and K. T. Miller, Socony-Vacuum Oil Co., Inc.; Joseph H. Denning, Venezuelan Atlantic Refining Co.; F. C. Jones, Phillips Oil Co.; and R. E. Russell, Industry's Consulting Organization, the authors point out that the most influential of the factors governing oil-field development in Venezuela are oil supply, demand, and price; grade of petroleum; recoverable reserves, production characteristics, field size and shape, geography, and availability of oil-field equipment. Coupled with these are cost of the land and its equipment, and availability of personnel.

A number of methods for obtaining optimum production are used in Venezuela. All were discussed at length. Venezuelan oil-field development prior to 1950, the authors stated, was characterized by seven periods of distinct trends: 1913-22, initial production and development; 1923-29, first large-scale development; 1930-32, depression decline; 1933-42, postdepression recovery; 1943, early war decline; 1944-48, war effort and postwar high demand; and 1949, postwar decline.

Production.—Dr. Carlos Rojas Davila, Creole Petroleum Corp.; A. N. Lucie-Smith, Shell Caribbean Petroleum Co.; and H. Austin, Mene Grande Oil Co., C.A., discussed conditions and practices inherent in Venezuelan production. Reservoir and crude-oil characteristics, reservoir control, pressure maintenance, and production methods were described, as were separation practices, dehydration, desalting, and gathering and storage.

Transportation.—In a paper prepared by the technical staff of Mene Grande Oil Co., C.A., the history of crude-oil and product transportation was traced, and the rapid advancements made in this field were emphasized. The first important pipe line was constructed in the country in 1917 by Caribbean Petroleum Co., connecting Mene Grande field with San Lorenzo refinery. A number of other lines were built from 1924-29, and the Venezuelan pipe-line system continued to expand as new fields were discovered and refineries erected.

There were, as of December 1949, nearly 2,000 km. of trunk pipe line, in size from 4 to 26-in. in diameter. Combined capacity was a little over 1,500,000 bbl. daily. The network of pipe lines spreads over five states in the country: Anzoategui, Falcon, Guarico, Monagas, and Zulia, and the Territorio Delta Amacuro.

The paper pointed out that from the international point of view the oil tanker ranks first as a method of transportation, and in Venezuela, the first oil-exporting country in the world, tankers are widely utilized. The ocean-going tankers have capacities from 80,000 to 250,000 bbl., and shallow-draft tankers are used primarily for movement of oil between Lake Maracaibo terminals over the shallow Maracaibo bar to Las Piedras, Amuay, Cardon, Curacao, Aruba, and foreign ports.

During 1949 ocean-going tankers lifted approximately 250,000,000 bbl. of oil at deep-sea terminals for direct export to countries all over the world. Shallow-draft vessels moved to foreign ports about 173,000,000 bbl. of crude, making the total approximately 423,000,000 bbl. exported by the country during 1949.

Refining.—Development of Venezuelan refining goes back to operation of a small teapot refinery in 1880 at La Petrolea. A 2,000 bbl. per day commercial plant began operation at San Lorenzo in 1917, followed by construction of a number of refineries in the period from 1925-31.

W. F. Mackie, Shell Caribbean Petroleum Co.; John Field, Creole Petroleum Corp.; R. M. Baskin, Venezuelan Gulf Refining Co.; and J. R. Martinez Ponte, Sinclair Oil & Refining Co., pointed out in their paper on refining operations that further expansion during 1938-39 resulted in a jump in refining capacity to 79,000 bbl. daily in 1939. Four large, modern plants have been completed in the past few years, and with these in operation, Venezuela's refining capacity reached about 290,000 bbl. daily by 1950. It is expected to increase further to about 340,000 bbl. daily before the end of 1953, the authors stated.

A number of petroleum products are produced by the various refineries. These include gasoline, bottled gas, aviation turbine fuel, and lube oils. Processes employed or soon to be employed in the country's refineries include single and two-stage crude distillation, vacuum distillation, thermal cracking including Dubbs cracking and visbreaking, reforming, polyforming, phosphoric acid polymerization, and several treating processes.

Natural gas.—J. H. Deming, Venezuelan Atlantic Refining Co.; A. N. Lucie-Smith, Shell Caribbean Petroleum Co.; R. E. McMillen, Phillips Oil Co.; and E. T. Lincoln, Sinclair Oil & Refining Co., in discussing natural-gas operations in Venezuela, stressed the increasing use of the fuel, both in camp residence areas, refineries, and field work. The Maracaibo district is the only place in the country

CONGRESS HEADQUARTERS.—Entrance to the Andres Bello College in Caracas, scene of the first Venezuelan National Petroleum Convention.

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where a major population and industrial center is in an oil-field area. A gas pipe line was economically and feasibly built at an early date to this area. The city consumes about 1,700,000 cu. ft. of gas daily.

Pemex-Sinclair Deal

Mexico acquires title to properties of El Charro

THE Mexican Government is acquiring title to properties of Cia. Mexicana de Petroleo El Charro, which is almost wholly owned by Sinclair Oil Corp.

Transfer of the properties has been agreed upon by top officials of Petroleos Mexicanos and Sinclair Oil Corp., ending a Mexican controversy dating back to shortly after the 1938 expropriation.

Under the agreement Pemex will take over El Charro's 500,000-acre concession in northeastern Tamaulipas. If drilling develops production, Sinclair will receive a percentage, either in oil or cash, up to a maximum of $1,850,000. If no production is found, Sinclair will receive nothing. Reports insist the agreement was reached several weeks ago, but there still has been no official announcement, either by Pemex or Sinclair.

The negotiations clear up the last claim of a major oil company resulting from the 1938 expropriation.

History.—Sinclair obtained the concession in 1928 and formed El Charro as an exploration company. Sinclair owned all shares except for a few given to Jose Carlos Nava, the Mexican attorney who helped secure concession rights and form the company.

Later El Charro joined Cia. Petrolera Titania, a Standard Oil Co. (N. J.) affiliate which held an adjacent concession, in a joint exploration agreement. Ten wells were drilled and an eleventh was down to 6,000 ft. when the expropriation decree was announced. The last well was plugged and abandoned immediately.

It has been estimated that the two companies spent a total of $9,000,000 during the time exploratory work was being conducted.

Sinclair went into the Mexican courts to obtain an injunction preventing the Mexican Government from taking over the properties, since El Charro was not named in the expropriation decree. The case remained in litigation until April 1950, when a federal judge in Tampico ruled in favor of the company. Pemex immediately appealed to the supreme court, where the case remained until the recent agreement.

Titania also went into court and won its suit against the government in the Mexican Supreme Court. The company reached a voluntary agreement with Pemex settling its claim in 1943.

Other proposals. — While there has been no announcement, reports persist that Sinclair is continuing negotiations for a contract covering future operations in Mexico. These talks are said to cover: (1) Purchase by Sinclair through its subsidiary, Sintex, S. A., of excess gas produced in northern Mexico for export to the United States; and (2) a wildcat drilling program for Pemex in the southern Isthmus of Tehuantepec.

MIDDLE EAST

Iranian Crisis Grows

Oil standstill causes increasing economic troubles in Iran; watch-and-wait attitude apparent in London circles

THERE are increasing indications that the Iranian situation will be coming to a head before long.

With oil operations at a standstill, the country's economic pinch is growing worse. Opposition to the government of Premier Mossadegh has increased since the breakdown of talks with the British. The British, aware of the growing tension, appear to be waiting for economic conditions to deteriorate further, hoping that financial troubles and increased opposition to the government in Iran might force a compromise in Mossadegh's unyielding nationalization stand.

Events over the week end, however, suggested that Britain may not be able to wait much longer.

Despite the lack of a voting quorum in the Majlis to approve his program Premier Mossadegh announced he will go ahead with his plans to expel all British from Iran if the British do not renew negotiations within 2 weeks.

The ultimatum to be delivered this week through President Truman's representative, Averill Harriman, indicated that the nationalization crisis is nearing. That the economic pinch is hurting was seen in the increased opposition to the government, evidenced by the fact that 29 of the 100 members of the lower house, the Majlis, failed to attend the Sunday meeting. Of these, about 15 are believed to be directly opposed to Mossadegh's program.

Iran's position.—Speaking before the Iranian Senate, Mossadegh accused the British of delaying the talks so that the economic crisis might grow worse, asserting that any further delay would benefit Anglo-Iranian Oil Co.

His plan to expel all British from the country if no new proposals were submitted by the British was given a 26 to 1 vote of confidence in the chamber.

He told the senators he planned no compromise in his nationalization program and would continue to oppose operation of Iran's oil industry under a British manager. He did say, however, that he would be willing to have an operating board of directors composed of representatives of neutral countries and Iranian experts.

Other Iranian leaders accused Britain of attempting to sit on the fence, hoping that a revolt in Iran might topple the present government.

British position.—There was a growing feeling that Britain would use force to prevent the expulsion of company executives and technicians from Iran, regardless of the ultimate result. The belief was expressed that Britain's prestige has suffered so greatly already that the country could not afford to withdraw and permit the Iranians to take over the oil properties. Supporting this was the announcement that four additional destroyers had been sent by Britain to the Persian Gulf.

A watch-and-wait attitude was apparent in London, where one source said the country could not think of reopening talks "until the dust settles."

"Persia," he said, "is faced with economic difficulties which must inevitably come to a head in the next few months. Perhaps the pressure of realities will cause some amelioration of the present attitude."

Meanwhile, Anglo-Iranian told the world it will sue "any concern or individuals" of any country who might attempt to buy oil direct from the Iranian Government.

The company asked for a world boycott of oil from its nationalized fields in Iran and said it is confident that "no oil company of repute, or tanker owner, or any brokers of standing, will countenance any direct or indirect participation in the unlawful actions of the Iranian Government.

Developments abroad.—India was reported negotiating with the United States for badly needed supplies of aviation gasoline. Stocks there have been dwindling since the Iranian crisis developed.

In Argentina, new rules were announced tightening fuel and diesel-oil rationing. The order granted unlimited amounts to cement and electric plants but held other consumers to previous allocations and authorized even further cuts for them when necessary.

Reports that Argentina had offered tankers to Iran for use in marketing operations were denied both by the Iranian minister to Argentina, Hassan Ali Gaffary, and a spokesman for the Argentine foreign ministry. The Argentine spokesman said his country's tanker fleet is now fully employed.

Movement of oil from Kuwait was increasing, boosted by the use of tankers which formerly hauled oil from Iran. Kuwait Oil Co. said it loaded 181 tankers in July and about the same number in August, increasing exports from the country to more than 650,000 bbl. per day.

Meanwhile, M. Navab, Iranian delegate to the United Nations Economic and Social Council, asked the council if it would help recruit technicians if a request were made. He was told such a request would be considered if and when it were submitted.

Theft increasing.—Theft of oil-company property continued to increase. Authorities reported 39 thefts or attempted thefts during 1 week from the company's housing area at Abadan. Petty pilferage, the company said, was giving way to wholesale theft in truckload lots.

One theft involved a large quantity of electric cable, and another 31 ceiling fans. Iranian troops were sent into the oil fields in an attempt by the government to control the looting of equipment.

Pay problem.—The economic pinch was hurting individuals as well as the government. Native workers were without an income last week, having received their last payment for the period ended September 1.

Also in question was the pay status of British technicians remaining in the shutdown Abadan refinery. With the company out of operation, there was speculation that responsibility for payment of executives and operating personnel might henceforth fall on the British Government, since their remaining in Iran is due to political preference rather than actual company operations.

Fawley Refinery Opened

Prime Minister Clement Attlee offically opened the new Esso refinery at Fawley, England, this week. Fawley, the largest refinery in Europe, plus other new plants now under construction in England, will raise the country's production of refined products within the next 2 years to more than 140,000,000 bbl. a year, compared with about 25,000,000 bbl. in 1948.

This capacity will meet almost 100 per cent of the United Kingdom's demand. Fawley alone will account for nearly 30 per cent of domestic production.

EUROPE

Refinery Plan Successful

OEEC reports establishment of major European refining industry is realized; 1,300,000-bbl. daily output seen

THE appearance of the first report on refinery expansion by the Organization for European Economic Recovery (OEEC) in Paris 2 years ago was the occasion of some misgivings in various quarters of the American industry where it was felt that the program was padded with overbuilding and that certain projects using Marshall-plan money could not be justified on sound economic grounds.

The recently issued second report on the same subject comes out under completely changed circumstances, however. Events of the last few months in Iran have outdated some of the figures. The burden of replacing Abadan falls largely on Europe, and the industry is looking to still greater expansion in processing capacity and for completion of projects earlier than originally scheduled.

In its revised report, the OEEC finds that refinery capacity of participating countries in Western Europe, which excludes mainly Spain, will reach 65,100,000 tons in 1952-53. This is equivalent of about 1,300,000 bbl. daily.

The 1949 report estimated a 1952-53 capacity of 62,400,000 tons, or about 1,250,000 bbl. daily. However, the increase over the earlier report actually amounts to only 1,100,000 tons since the 1949 study did not include some 1,600,000 tons of capacity in the Naples, Italy, refinery of Socony-Vacuum, and in the plants at Trieste. There also are variations in the programs of the individual countries.

U.K. largest.—The United Kingdom still ranks as the largest prospective European refining country with an anticipated throughput capacity in 1952-53 of 21,330,000 tons or about 426,000 bbl. daily. The projected refinery in Greece has been deferred.

Emphasis on cracking.—The new OEEC report notes that Europe is placing increasing emphasis on the construction of cracking facilities. The goal here is to raise motor-fuel octane and give greater flexibility to refinery yields. OEEC remarked that European refiners are expected to attempt to lift octane ratings from the present 70-72 level by a few points and closer to the 78.2 rating for regular grade in the United States.

The total cost of the European refinery-expansion program over the period 1948-53 is estimated at $1,018,000,000 of which about $169,000,000 is actual dollar expenditure. To date, the Economic Cooperation Administration has financed in whole or in part 12 refineries involving $35,000,000 of assistance.

New equipment outlets.—OEEC commented that "the expansion of European refineries has represented a major opportunity to European equipment manufacturers to develop new outlets." They have been aided by United States engineering, and are now, because of the European Payments Union and the 1949 currency devaluation, better able to compete with United States manufacturers. "Financial arrangements that have been made between various countries and principal American oil groups on the utilization of local currency . . . will provide additional opportunities for European equipment manufacturers," the report said.

Consumption.—Inland consumption of refined petroleum products in OEEC countries is expected to rise to 60,900,000 tons by 1952-53. The earlier estimate in 1949 was for an increase to 58,600,000 tons. OEEC indicated that it was not concerned over the possibility of overexpansion of refining capacity, at least from a European standpoint. The demand for oil products remains "remarkably buoyant," and on the basis of any assessment of energy requirements, will continue to increase in the future.

According to the report, inland oil consumption will increase by 133 per cent between the prewar period and 1952-53, and the production from domestic refineries will rise by 428 per cent in the same period.

Imports.—Of the European imports in 1952-53, the bulk, consisting of 8,971,000 tons, will be bunker fuel. About half of the import total, or some 5,700,000 tons, will be from nondollar sources. However, the loss of Abadan's nondollar refining capacity and the resulting heavy British buying program in the United States since the report was prepared, has upset these expectations.

Salient facts regarding the supply situation and refinery program in the individual countries were reviewed in the report.

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PERSONALS

Exploration Chief

Roustabout to manager is background of Vic King

VIC H. KING, formerly supervisor of exploration for General Petroleum Corp. in the Rocky Mountain district, who was recently appointed to the newly created position of manager of exploration in the Los Angeles general offices, is responsible for the coordination and correlation of all activities of all the department's divisions.

With General Petroleum since June 1936, except for 3 years during World War II, King is thoroughly familiar with the problems of drilling and producing. Graduating in geology from the University of Southern California in 1936, his first 1½ years with the company were spent as a roustabout in the San Joaquin division.

From then until he entered the Navy in October 1942, King successively was in the geological department at Los Angeles and in the San Joaquin area. During his tour in the Navy, he spent the last 1½ years at Elk Hills working with the Naval Reserve unit in increasing that field's production.

Following his discharge in January 1946 and prior to becoming supervisor at Casper, Wyo., he was district geologist at Sacramento, Calif., and senior geologist at Casper. King is a native of Colorado Springs, Colo.

William H. White has resigned his position as geologist with The California Co. in New Orleans to open geological offices for Pan-Am Southern Corp. in Lafayette, La., to cover the Louisiana Gulf Coast area. **John E. Brewster,** of Shreveport, La., has been promoted from assistant manager of the crude-oil purchasing department of Pan-Am to manager. Brewster will maintain his office in Shreveport company headquarters.

Robert J. Garrett, formerly geologist with Superior Oil Co.'s Oklahoma City office, and for the past year manager of operations in the Persian Gulf, has been promoted to vice president of International Marine Oil Co., Ltd., the subsidiary of Superior which is handling the Middle East operations.

H. T. O'Neill has been appointed treasurer of British American Oil Co., Ltd., and **Robert Donellan,** appointed secretary of the firm.

Ralph H. Hamblin, formerly district geologist with Cities Service Oil Co. at Olney, Ill., and later a consultant at Mattoon, Ill., has opened an office at Denver as consulting geologist for the Rocky Mountain region.

Willis Morgan, formerly administrative assistant to the manager of British American Oil Co.'s Calgary, Alta., Canada, refinery, has been transferred to the company's Moose Jaw, Sask., Canada, refinery as assistant manager.

Delmer L. Powers and **David L. Evans** have formed a geological consulting partnership in Wichita. Powers has been active as a consultant in Wichita since 1938, and Evans recently resigned from Ohio Oil Co. after serving 6½ years as subsurface geologist in Wichita and as research geologist in Tulsa.

Rudolph A. Rivera, formerly assistant design engineer for the Government of Puerto Rico at San Juan, has joined Sunray Oil Corp. at Jennings, La., as production engineer.

R. B. Gie-entanner, district foreman for Interstate Oil Pipe Line Co. at Drumright, Okla., has been transferred to Shreveport, La., as senior engineer.

J. O. Fair has been transferred to Midland, Tex., as field superintendent for Stanolind Oil & Gas Co.'s North Cowden area. He replaces **A. J. Knopp,** who has been transferred to Sweetwater, Tex., as field superintendent for that area.

Elvin Odell Campbell has joined E. I. du Pont de Nemours & Co.'s petroleum-chemicals division. He will assume managership of the Mid-Continent district laboratory in Tulsa on October 1. He was formerly the chief of the standards and specifications section of the technical branch, Munitions Board petroleum division.

Henry Keplinger, of Keplinger and Wanenmacher, petroleum engineers at Tulsa, recently left to study reservoir and operating problems of Digboi field in India, located northeast of Calcutta near the China-Burma border. The assignment is for Burmah Oil Co., Ltd.

Harry W. Kaley will resign as a vice president and director of Ethyl Corp. effective September 30. He was one of the early pioneers in the sale of Ethyl antiknock compound, and during the many years of his association with the industry he occupied numerous positions in Ethyl's sales department, including that of vice president in charge of sales. He is a member of the Twenty-Five Year Club of the petroleum industry. Kaley will continue to serve Ethyl as a consultant following his resignation.

G. McCULLOUGH

G. W. McCullough, former executive vice president and general manager of Phillips Chemical Co. and Phillips Terminal Co., has been named chairman of the operating committee of Phillips Petroleum Co., replacing **J. E. Bogk** who resigned to enter private business. **T. L. Cubbage** has been named vice president and general manager of both firms and will direct operations for both. McCullough joined Phillips in 1925 as a draftsman, and after holding several other positions was named chief engineer of the natural-gasoline and gas department in 1943. He became assistant manager of the defense-plant division and superintendent of the Plains butadiene plant at Borger, Tex., in 1943. He was made manager of the defense-plant division and assistant to the manager of the natural-gasoline and gas department in 1944. He will continue as a director and vice president of both companies.

Paul D. Fell, having completed his assignment as consultant to the transportation director of the Petroleum Administration for Defense, Washington, D. C., has returned to Sinclair Pipe Line Co. at Independence, Kans., and resumed his regular duties as assistant chief engineer. Recent changes in the firm include: **J. D. McConnell,** appointed administrative assistant in the executive department, who will assist vice presidents **William H. Morris** and **R. C. Bearden** in the operation of crude lines; **E. F. Post,** assistant district superintendent of the Shawnee, Okla., district, transferred to the Independence district

PERSONALS

to assist District Superintendent **R. J. Osborn** with headquarters at Great Bend, Kans.; and **A. W. Protiva,** assistant district superintendent at Wichita, transferred to Shawnee to assist **C. D. Welch,** district superintendent.

Henry J. Tyler, division staff geologist for Phillips Petroleum Co., in Bartlesville, Okla., has been appointed district geologist in Shreveport, La., succeeding **R. H. Chambers,** who has resigned to become an independent geologist in Houston. Tyler's new district includes southern Arkansas, northern Louisiana, and East Texas.

J. B. JARED, JR.

J. B. Jared, Jr., has been elected vice president and director of American Petroleum Co., subsidiary of American Republics Corp., Houston, and, in addition to his duties as chief civil engineer of the latter company, will be engaged in management of the former's pipe-line system. **W. T. Bryant** has been appointed assistant manager of the production department in charge of gasoline and cycling plants for American Republics, and **J. O. Trotter** has been appointed manager of the traffic division.

Robert Womack, Jr., has resigned as district exploration superintendent for the southeastern states for The California Co., and has opened offices at Jackson, Miss., as a consulting geologist.

Jim Gibson, of Wichita, has been transferred to Shreveport, La., by Sohio Petroleum Co., as production superintendent. He replaces **L. B. Records,** who has been transferred to Lafayette, La., as district superintendent.

S. W. Totten has been appointed district exploration superintendent in the Jackson, Miss., office of The California Co.

Bruce Pearson, assistant district geologist for Seaboard Oil Co. at Corpus Christi, Tex., has resigned and will move to Midland, Tex., to become a consultant.

Frank W. Morgan and **M. E. Torline** have entered the geological consulting field and have established offices in Wichita. The firm will be known as Morgan & Torline. Morgan recently has been a member of the geological staff of Lario Oil & Gas Co., and Torline has been active as an independent geological consultant.

W. A. Dawson, geologist for Skelly Oil Co., has been transferred from Holton, Kans., to Albuquerque, N. M.

Wilbur Griffith, formerly of Calgary, Alta., Canada, has moved to Billings, Mont., as an independent, and will be associated with **Ed Butler.**

P. D. Grommon, Jr., assistant division petroleum engineer for The Texas Co. at Fort Worth, has been transferred to Pampa, Tex., and promoted to assistant district superintendent.

H. V. Church, formerly district geologist for Shell Oil Co. at Bakersfield, Calif., has joined Oceanic Oil Co. as senior geologist in the Bakersfield offices.

L. C. Decius has retired as vice president and director of exploration for Tide Water Associated Oil Co. He served the firm and its predecessor, Associated Oil Co., for 35 years.

E. L. Martin, assistant pipe-line-maintenance foreman for Shell Pipe Line Corp., has been transferred from Eunice, N. M., to Colorado City, Tex., as pipe-line-maintenance foreman. Other changes and transfers include: **D. F. Cooledge,** district chief gager, from Hendricks to Penwell, Tex.; **L. C. Dodd,** tank-farm gager, from Cushing to Elk City, Okla., as station engineer; **H. R. Good,** pipe liner, from Wink to McCamey, Tex., as tank-farm gager; **C. T. Harris,** pipe liner, from Eunice to Penwell as pumper gager; **D. A. Heatherington,** pipe-line maintenance foreman, from Colorado City to McCamey; **O. O. Morgan,** district chief gager, from Penwell to Hendricks; and **B. F. Terrell,** tank-farm gager, from McCamey to Wasson, Tex., as field gager.

K. A. Gorton, formerly assistant supervisor of exploration in the Rocky Mountain district of General Petroleum Corp., has been appointed supervisor of exploration of the Rocky Mountain division, replacing **V. H. King** who has been appointed manager of the firm's exploration department. Gorton's offices will continue to be in Casper, Wyo. **K. A. van der Weg,** supervisor of geophysics in the Rocky Mountain division at Casper, has been transferred to Los Angeles as supervisor of geophysics, replacing **N. R. Shade** who has retired. **A. G. Alpha** has been advanced from district geologist, Montana, to regional geologist, with offices in Casper. **F. R. Reeves,** formerly with Western Geophysical Co., has joined the firm's Casper office as geophysicist. **R. A. Howe** has been advanced to district geologist, Northwest Colorado, from his previous position as assistant geologist, and continues to make his headquarters in Craig, Colo. **J. E. Keenan** has been transferred to Billings, Mont., as district geologist, Montana. He formerly held the same position in Northwest Colorado. **J. H. Casey,** district geologist, has been transferred from the East Wyoming area to the same position in the Santa Maria, Calif., district.

H. B. Smithwick, party chief for Atlantic Refining Co., has been transferred from Crosbyton to Rankin, Tex.

Richard L. Conover has been appointed assistant to the president and general manager of Kentucky-West Virginia Gas Co. He previously had been associated with Duff & Phelps, a firm specializing in analyses of gas-utility operations, and North Shore Gas Co., Waukegan, Ill.

John W. Borror, senior engineer for Sohio Petroleum Co. at Oklahoma City, has been transferred to Houston and promoted to district superintendent.

Peter F. Chapman, exploration engineer for Shell Oil Co. at Elk City, Okla., has been transferred to Centralia, Ill., and promoted to reservoir engineer.

William Gruenerwald has opened offices in Chicago as a consulting geologist. For the past 2 years he has been associated with Paul Weir Engineering Co. of Chicago.

Chester Doyle, formerly petroleum engineer for General Petroleum Corp. in the San Joaquin Valley, with headquarters at Taft, Calif., has been promoted to assistant chief engineer in the Los Angeles offices.

Ben Anderson, executive supervisor of Union Oil Co.'s research laboratories at Wilmington, Calif., recently was elected chairman of the Southern California section of the Society of Automotive Engineers.

William B. King, division manager with Phillips Petroleum Co. at Salt Lake City, has been transferred to Bartlesville, Okla., and promoted to regional manager in the crude-oil-purchasing and sales department.

Irving J. Staid has been promoted to manager of Carter Oil Co.'s manufacturing department at Billings, Mont., where he has been assistant manager. After graduation from University of Alabama in 1938, he joined Esso

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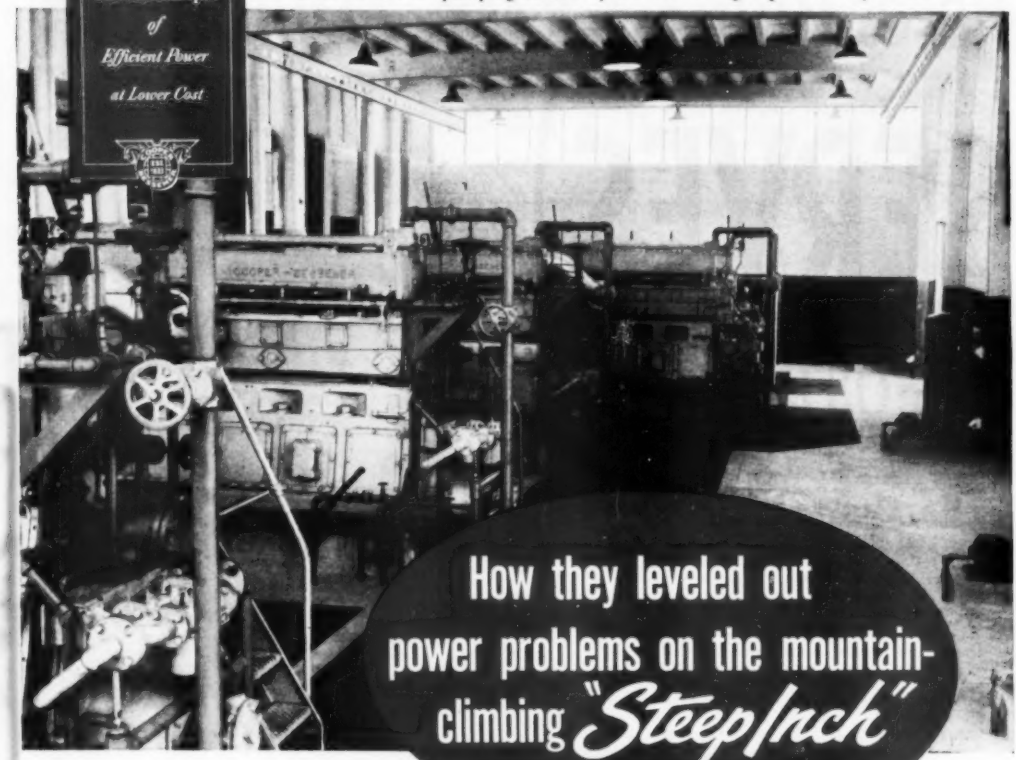
Three of five Cooper-Bessemer JS-8 diesels, rated 580 hp at 450 rpm, in the Catia de la Mar pumping station of the new Tacagua petroleum products line.



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WHAT with grades up to 45 per cent, it's no wonder the Tacagua products line is nicknamed the "Steep Inch." This new line, joint project of Creole Petroleum Corporation and Shell Caribbean Petroleum Company, rises sharply from sea level at Catia de la Mar, reaches a crest of 3,200 feet over mountainous terrain, and terminates at Caracas.

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PERSONALS

Standard Oil Co. at the Everett, Mass., refinery, then went to Carter in 1945 as chief engineer of the Billings refinery. The following year he was made assistant manager of the manufacturing department.

C. A. Breitung recently resigned as supervisor of the gas department of the Railroad Commission of Texas, and has opened offices in Austin, Tex., as an oil and gas consultant.

William Goodier, reservoir engineer with Sunray Oil Corp., has been transferred from the company's Newhall, Calif., division offices to the regional office at Los Angeles.

W. B. Sanford has joined Anschutz Drilling Co. as district exploration head at the new district offices at Denver. He was formerly geologist with The Texas Co.

O. L. Henson, owner of Henson Drilling Co., has moved his offices from Flora, Ill., to Abilene, Tex.

Bill Wilson, of Cheyenne, Wyo., has joined **Walter Davis,** Casper, Wyo., independent oil operator.

V. W. Rooke has been named assistant to **C. F. McGoughran,** vice president of Sinclair Refining Co.

J. Kenneth Barton, chief engineer in charge of waterflooding for Quaker State Oil Refining Corp.'s production department, Bradford, Pa., has been appointed a member of the Pennsylvania Grade Crude Oil Association's production - research technical - advisory committee.

M. J. Beard, station engineer for Shell Pipe Line Co. at Douglass, Tex., has been transferred to Houston as relief dispatcher. Other changes in the firm include: **F. E. Fitzgerald,** dispatcher at Cushing, Okla., transferred to Wood River, Ill., as assistant station chief engineer; **J. C. Pepper,** tank-farm gager at Douglass, promoted to station engineer; **R. G. Pierce,** district gager at Elk City, Okla., transferred to Elyria, Kans., as district chief gager; **J. J. Sanders,** district chief gager at Elyria, transferred to Cushing as assistant tank-farm chief gager; **W. N. Thomas,** pipe liner at Opelousas, La., transferred to Courtableau, La., as station engineer; **D. R. Wisdom,** tank-farm gager at Goodrich, Tex., moved to Brookshire, Tex., as station engineer; and **O. J. Wood,** assistant chief tank-farm gager at Cushing, transferred to Wood River as tank-farm chief gager.

Robert Bischoff, formerly field superintendent for Seaboard Oil Co. at Edmonton, Alta., Canada, has been named general superintendent of the Rocky Mountain area with offices at Casper, Wyo.

Sen. Antonio Bermudez, director of Petroleos Mexicanos, has arranged for a group of 23 Mexican oil workers to take a 6-month tour of oil fields in the United States to study production methods.

R. G. Greene has been advanced to manager of exploration in Union Oil Co.'s western area, including the Pacific Coast, Rocky Mountain, and Canadian divisions. **John R. Sloat** has stepped into Greene's former post as manager of the Pacific Coast division. Both will work from the Los Angeles general office. **Charles Manlove,** geologist for Union Oil Co., has been transferred from Orcutt, Calif., to the firm's Rocky Mountain division at Casper, Wyo. **William Greenwalt, Jr.,** succeeds him at Orcutt.

Frank F. Claunts, district landman at Abilene, Tex., for Warren Oil Corp., has been transferred to the new Denver office where he will be division landman in charge of the Rocky Mountain area.

Dr. Walter J. Fenny, of Winnipeg, Man., Canada, has joined Deep Rock Oil Corp. as representative of the land and exploration division in Calgary, Alta. **Dale Benedict,** Oklahoma and Mid-Continent landman since 1925, has been named assistant manager of Deep Rock's land department.

DEATHS

Charles M. Cotton, 67, chairman of the board of Jergins Oil Co., died September 4 at Santa Monica, Calif. He had been active in the oil industry since 1922 when he helped form the A. T. Jergins organization to participate in the early development of Signal Hill oil field. The trust was incorporated as Jergins Oil Co. in 1938, and Cotton served as vice president and general manager until last year when the firm was sold. Since the transaction he had served as chairman of the board.

John S. McCullough, 83, pioneer oil man, died at Mercer, Pa., August 28. He moved to Shreveport in 1907 when oil development began in North Louisiana and lived there until the time of his death. He was at one time president of Triangle Drilling Co.

Clyde Creighton, 59, pioneer independent oil operator of Texas, Louisiana, and Mississippi, died in Dallas September 1. Active in the oil industry for more than 35 years, he was one of the openers of rich Tinsley field, Mississippi's first oil discovery.

William S. Ackerman, 59, formerly executive official in the crude and products department of Tide Water Associated Oil Co. at San Francisco, died recently in Hollywood, Calif.

Otto Detjen, 56, veteran employe of Gulf Oil Corp., died September 6 in Tulsa. He had been an auditor for Gulf for 35 years.

James FitzGerald, Jr., 47, well-known Midland, Tex., independent oil operator, died August 29 in Washington, D. C. He joined Skelly Oil Co. in Tulsa in 1927 as a geologist and was transferred to Midland in 1933 to head the firm's West Texas-New Mexico division office as geologist-landman. In 1943 he resigned and became an independent.

Edwin H. Taylor, 61, independent oil operator, died at Midland, Tex., August 29.

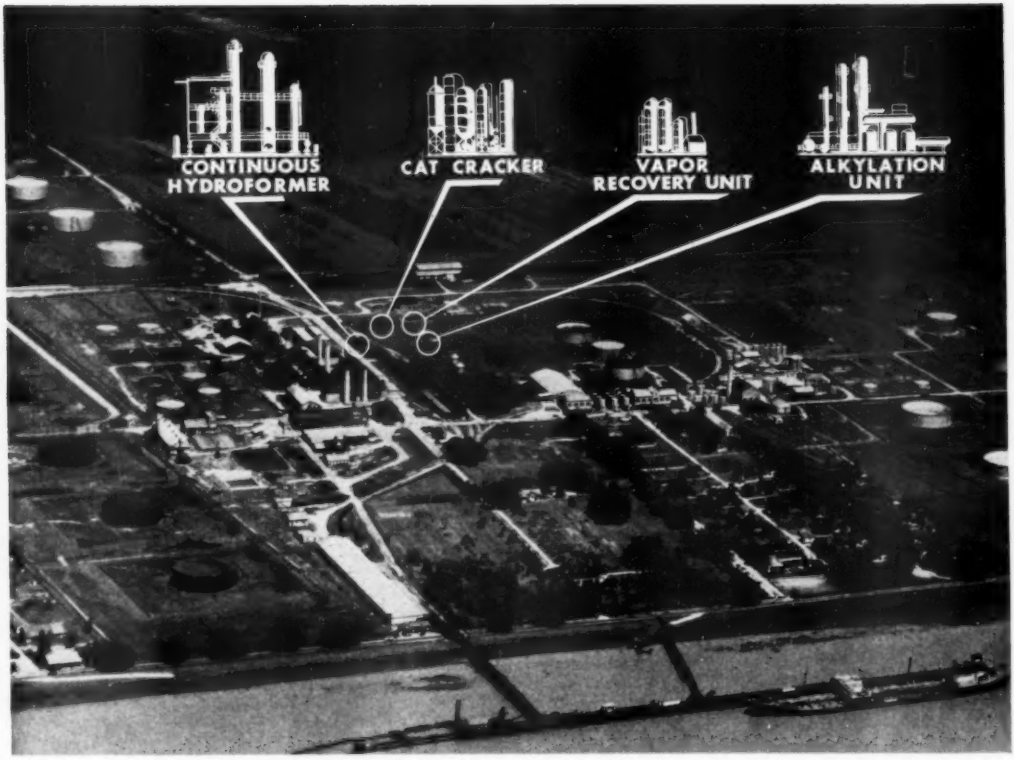
John E. Scully, Jr., 40, contracting engineer for Tide Water Associated Oil Co. of New York, died September 4 in New York.

W. A. Woolsey, 50, operating vice president of Brown & Root, Inc., was killed September 1 when he was thrown from a horse on his ranch near Boerne, Tex.

Eugene Beacon Fish, 81, formerly president of Los Angeles-New Mexico Oil Co. and Wellington Oil Co. of Los Angeles, died September 5 in Los Angeles.

David Claude Richardson, Jr., 63, independent oil operator, died in Shreveport on September 4.

Harold T. Lovelace, 45, owner and president of General Oil Field Supply Co. at Olney, Ill., died September 2 from injuries received in an automobile accident near Wadesville, Ind.



Plant expansion now under way at the Destrehan, La., refinery of Pan-Am Southern Corp. will more than double crude-oil capacity. Other facilities to be installed under the program include those superimposed on this photograph of the Destrehan plant.

Pan-Am Southern Accelerates Expansion

Design basis for expanded refinery is 20,000 bbl. of crude per day, consisting of 5,000 bbl. of asphaltic and 15,000 bbl. of coastal

by Dr. J. W. Bertetti

THE 8,000-bbl. per day refinery at Destrehan, La., will be more than doubled within a year in an expansion program of Pan-Am Southern Corp. The expanded 20,000-bbl. plant will also contain a 12,000-bbl. fluid catalytic cracking unit, giving a much wider range of flexibility in subsequent operations.

Expansion and modernization of the Destrehan plant had been included in the company's long-range budget for 1954-55, but in keeping with the defense program, Pan-Am greatly accelerated its expansion program. In addition, it has modified original plans to provide facilities designed primarily for the production of aviation gasoline.

The Destrehan refinery is located on a tract of 1,100 acres on the east bank of the Mississippi River about 18 miles upstream from New Orleans. Its present facilities consist of:

1. A crude unit normally processing about 8,000 bbl. per calendar day of asphaltic crude oil to asphalt bottoms.
2. Asphalt oxidizing, steam stilling, blending, and loading facilities.
3. Lube and grease blending, compounding, and packaging facilities.
4. Terminaling facilities, with 3,000,000 bbl. of tankage, and a river dock 980 ft. long capable of handling ocean-going tankers.
5. Auxiliary rundown, treating, blending, utility, and other usual refinery facilities. There are no cracking facilities.

Expansion basis.—Design basis for the expanded refinery is 20,000 bbl. of crude per calendar day, consisting of 5,000 bbl. per day of asphaltic crude and 15,000 bbl. per day of light coastal crude. The present crude unit will be modified to permit simultaneous topping of both crudes at these rates, with asphalt bottoms to be produced from the heavy crude and a vacuum flash bottom for No. 6 fuel to be produced from the light crude.

After considerable study, the process units selected for installation are a fluid catalytic cracking unit to operate in blocked-out operation with a re-treating cycle, a vapor-recovery unit, a sulfuric acid alkylation unit, and a fluid hydroforming unit.

First pass, design basis, for the cat cracker is 12,000 bbl. per stream day

of virgin gas oil at 70 per cent conversion plus 180 bbl. per calendar day of slurry recycle. In second-pass operation, the feed will consist of gasoline from the first pass except for the aromatic 220°-335° F. boiling-range fraction. The 335°-450° F. fraction will be recycled to extinction in this operation. The unit is designed for a coke-burning rate of 11,700 lb. per hour, the rate expected during gas-oil cracking. The design cycle is 22 days on first pass and 6 days on re-treat, with about 2 days consumed in switching. Table 1 summarizes these design data.

The vapor-recovery unit is designed to recover 60 per cent of the propylene produced, and the alkylation unit is designed to process all recovered C_3 and C_4 olefins to produce 2,500 bbl. of aviation alkylate per stream day. In this operation an isobutane deficiency of 190 bbl. per stream day must be balanced by outside purchase. The alkylation unit design also provides for a production rate of 2,500 bbl. per stream day while alkylating only butylenes for maximizing production of grade 115-145 aviation gasoline. For this operation, an outside supply of 710 bbl. per stream day of butylenes must be provided.

The fluid hydroforming unit is designed to operate at a reactor fresh feed rate of 2,000 bbl. per stream day of 200°-400° F. boiling-range straight-run gasoline.

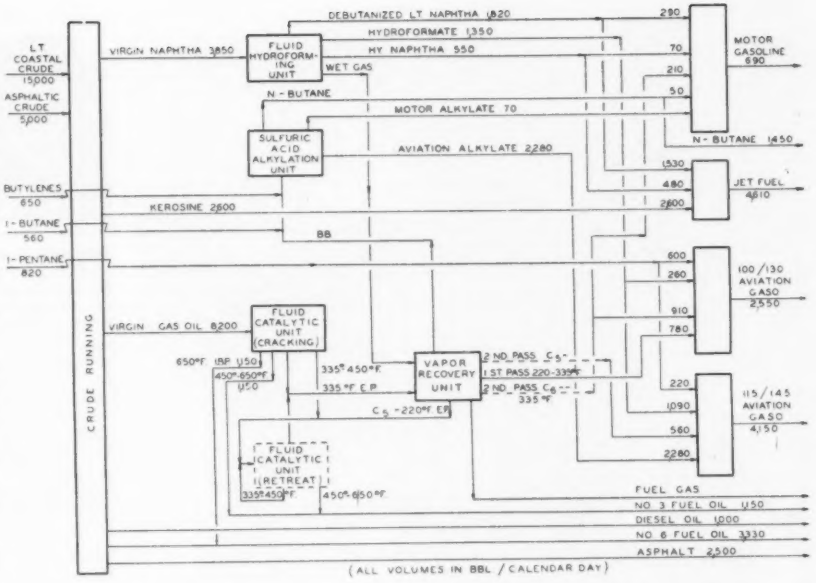


Fig. 1—Refinery balance when operating for maximum grade 115-145 aviation gasoline.

Military fuel production.—Fig. 1 shows diagramatically the over-all and intermediate charge and product streams on a calendar-day basis while operating for maximum production of grade 115-145 aviation gasoline. This shows that the facilities will provide a production potential of 4,150 bbl. per calendar day of grade 115-145 while simultaneously producing 2,550 bbl. per calendar day of grade 100-130 aviation gasoline, and 4,610 bbl. per calendar day of JP-3 military jet fuel.

TABLE 1—DESIGN BASIS FOR CATALYTIC CRACKING UNIT

First pass—	Peak, B.S.D.	Average, B.C.D.
Virgin gas oil	12,000	8,175
Recycle	None	None
Slurry	180	123
	12,180	8,298
Second pass—		
C_5 - 220	9,140	1,800
335-450 (from first pass)	4,060	800
335-450 (recycle)	2,760	540
	15,960	3,140

Maximum coke burning capacity = 11,700 lb. per hour.

TABLE 2—CHARGE AND PRODUCTS
(Barrels per calendar day)

Charge	1*	2†
Light coastal crude	15,000	15,000
Asphaltic crude	5,000	5,000
Outside butylenes	650	
Outside isobutanes	560	775
Outside isopentanes	820	900
Products—		
Avgas 115-145	4,150	
Avgas 100-130	2,550	7,710
Total avgas	6,700	7,710
Motor gasoline	690	
Total gasoline	7,390	7,710
Jet fuel	4,610	3,800
N-butane	1,450	1,500
Diesel	1,000	1,000
No. 3 fuel oil	1,150	1,150
No. 6 fuel oil	3,330	3,330
Asphalt	2,500	2,500

*Case 1—Maximum production grade 115-145 aviation gasoline. Alkylation plant producing butylene alkylate only at full capacity. †Case 2—Maximum production of grade 100-130 aviation gasoline with on 115-145 aviation gasoline produced.

TABLE 3—FLUID HYDROFORMING YIELDS AND PRODUCT QUALITY

Feed—Coastal heavy naphtha, 220°-335° F. 55-60 per cent naphthenes content, 60 C.F.R.-R-Clear O.N.

Products	Per cent Volume	Per cent Weight
Dry gas		12.2
C_3's	7.0	5.3
C_4's	74.0	78.6
Polymer	3.0	3.4
Coke		0.5
		100.0
Product quality—		Avgas
Volume per cent yield		*74.0 †94.6
R.v.p.		4.0 7.0
C.F.R.-R. clear		
F-3 + 4.6 cc. TEL		97.0
F-4 + 4.6 cc. TEL		165

*C_4-335° as produced. †Pressured to 7 lb. R.v.p. with iC_4.

THE AUTHOR

J. W. Bertetti joined the Whiting, Ind., research laboratory of Standard Oil Co. (Indiana) in 1934 and was transferred in 1936 to the research department of a subsidiary, Pan-American Refining Corp., in Texas City, Tex. In 1942, Dr. Bertetti joined Root Petroleum Co. (now a part of Pan-Am Southern Corp.) in El Dorado, Ark., as assistant chief engineer. There he was successively chief engineer, technical director, and refinery manager. In March of this year he was transferred to the New Orleans office of Pan-Am Southern as assistant general manager of manufacturing. Dr. Bertetti holds degrees of B.S. and Ph.D. respectively, from Universities of Illinois and Michigan, in chemical engineering.

Table 2 additionally shows that the expanded refinery, when operated to maximize production of grade 100-130, can produce 7,710 bbl. per calendar day of that fuel together with 3,800 bbl. per calendar day of JP-3 jet fuel.

Ultramodern units.—The fluid catalytic cracking unit will be the so-called Model 1V. This units is based on a design by Standard Oil Development Co. which embodies a number

(Continued on page 134)

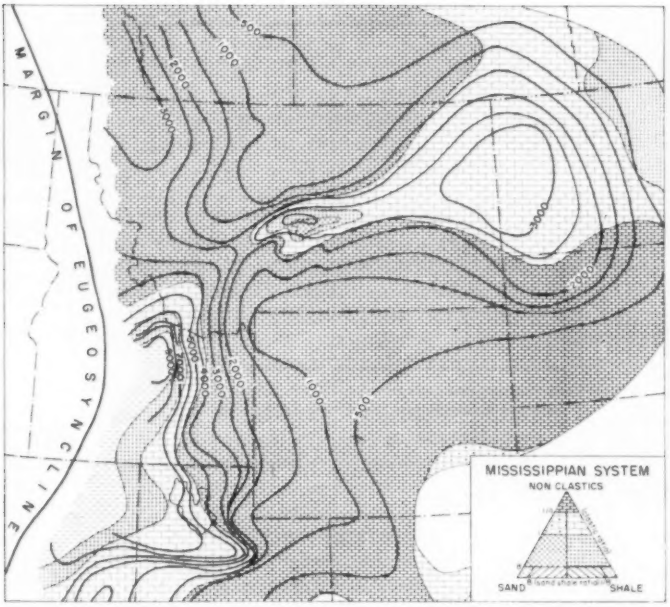


Fig. 1—Isopach-lithofacies map of Mississippian system in northern Rocky Mountain area. (Control points used in compilation of this and the following maps have been deleted in the interest of clearer reproduction.)

Stratigraphic Analysis

. . . in oil exploration

by L. L. Sloss

This tool, the author believes, is capable of providing the missing clue to a rational program of looking for oil

PETROLEUM geologists, and stratigraphers in particular, are faced with manifold problems in current exploration efforts. Certain of these problems are discussed in this article with a view toward indicating the manner in which the results of more or less academic research may be applied to practical cases.

One problem is concerned with the rate of absorption, digestion, and application of stratigraphic data. Expanded and accelerated exploratory-drilling campaigns are producing stratigraphic information in volumes which tax the conventional methods of applying and interpreting such information.

In addition, new techniques and concepts of petrographic analysis are squeezing more and more information from each sample, each core, and each run of a mechanical logging device. There is an evident need for integrating concepts which will make these new data available to exploration thinking without an excessive burden of man-hours.

Another, and yet related, problem involves stratigraphic patterns which are far removed, either horizontally or vertically, from adequate controlling data. Much thought is currently devoted to the oil possibilities of deeply buried strata beneath known production and to the possibilities of new areas as yet inadequately explored by the drill.

In each case, whether it be the Williston basin in North Dakota or the pre-Cretaceous of the Gulf Coast, the Great basin of Nevada and western Utah or the pre-Devonian in Illinois, the scanty information now available can be increased in value by extrapolation of trends and patterns from peripheral areas of greater control. A technique is required whereby scattered and inadequate data can be applied to the prediction of conditions over large areas.

THE AUTHOR

Dr. L. L. Sloss has devoted considerable time to a study of sedimentary facies and sedimentary analysis along lines which would help solve the problems of practicing geologists. He holds a B.A. degree from Stanford University and gained his Ph.D. from Chicago University in 1937. From 1937-43 he was on the faculty of the Montana School of Mines and from 1943-46 he was with the Montana Bureau of Mines and Geology engaged in cooperative research with the Fuels Section, U.S.G.S., on stratigraphy and petroleum geology of Devonian and Mississippian in the Montana area. He joined Northwestern University as associate professor of geology in 1947. He has acted in a consulting capacity for a number of major oil companies.

Applied Facies Analysis

Maps as integrating devices.—Geologists have long recognized the value of various types of maps for the visual expression and rational interpretation of a number of attributes of sedimentary rocks.

Maps showing the distribution, thickness, and structure of stratigraphic units are in daily use and are easily revised to accommodate a continuing influx of new data. Such maps form an important part of exploration and exploitation techniques, but they tend to ignore equally significant attributes of the sedimentary bodies involved—the lithologic character of the rocks themselves and the interrelationships of various lithologic types.

In general practice these critical properties are integrated by means of cross-sections, panel diagrams, and other modifications of two-dimensional expressions which can not be interpreted as readily as maps.

Most geologists would agree that no structural profile or series of profiles is subject to the unique interpretations that can be drawn from a structure-contour map. Similarly, no combination of cross-sections serves as a satisfactory substitute for an isopach map. Controlling decisions based on the lithologic attributes of sedimentary units, on the other hand, are derived almost entirely from analysis of cross-sections.

This disparity of treatment is the obvious result of the fact that, while structural position and thickness may each be represented by a finite number, neither lithologic character nor the relationship between lithologic

types can be expressed by a simple number.

This situation is reflected in the numerous facies maps which have appeared and which treat lithologic attributes in broad qualitative terms. Such maps are useful for generalized visualization and interpretation of stratigraphic conditions, but they have several undesirable characteristics.

The boundaries between mapped "facies" are usually subjectively drawn on the basis of the opinion of the individual cartographer. Other workers, provided with the same data, would arrive at other boundaries and patterns which could be equally well supported. Since the facies patterns are subjectively drawn the resulting maps are not easily "posted" and kept up to date with new information, except by the original worker.

Furthermore, adjacent and closely related areas will tend to appear as markedly distinct provinces as a result of differing treatment of similar conditions.

Quantitative facies. — Many geologists have noted the deficiencies mentioned above and have experimented successfully with "net sand," "pay thicknesses," and other attributes which can be numerically expressed.

In recent years these approaches have been brought before a wider audience and have been more or less formalized by a number of publications in the academic sphere (Kay, 1945; Krumbein, 1945; Read and Wood, 1947; Krumbein, 1948; Sloss, Krumbein, and Dapples, 1949; Sloss, 1950).

In essence, the various methods explored attempt to isolate from the complex of characters which make up a sedimentary rock significant attributes or aspects which may be quantified, expressed numerically, and made the bases of contour-type maps. The resulting maps are subdivided by objectively defined lines into areas of differing lithologic aspect; thus, they are quantitative facies maps.

Choice of attributes to be mapped.— The inherent complexity of the lithologic character of a succession of rocks makes available a wide choice of attributes which may be numerically expressed and contoured.

Selection of the most significant attributes depends on the nature of the individual problem and the end result desired, as well as on the types of rocks concerned and the kind and abundance of available data. In the average case it is usually necessary to experiment with a variety of maps before the combination yielding the most significant interpretations is discovered.

The stratigraphic group at Northwestern University has been interested in broad-scale investigation of stratigraphic units of continent-wide scope. For this purpose the combination of clastic ratio and sand-shale ratio developed by Krumbein (1948) has proved to be the most adaptable to a wide diversity of conditions and the kind of surface and subsurface data available in the published literature.

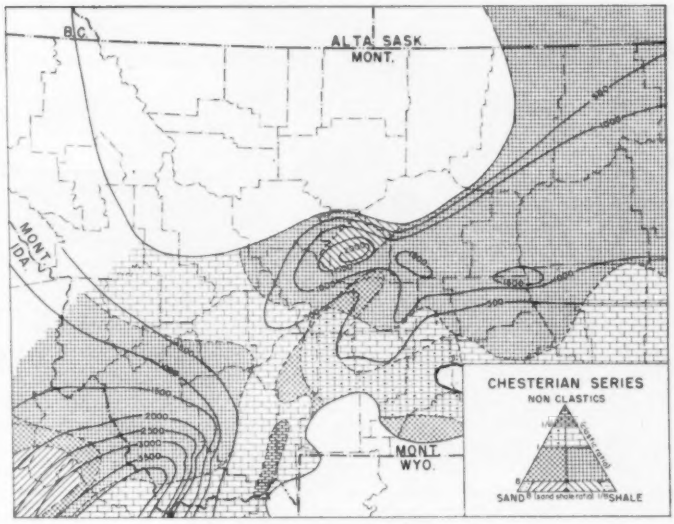


Fig. 2—Isopach-lithofacies map of the Chesterian series (Upper Mississippian) in the Montana area. (Modified after Sloss (1950) by the writer and A. D. Baillie.)

Relatively crude information makes possible the differentiation of clastic and nonclastic rocks and the distinction between coarse and fine clastics. When applied, in combination with isopachs, to thick stratigraphic intervals over large areas the resulting maps are subject to intelligent regional interpretation. A portion of such a map is reproduced in generalized form as Fig. 1.

At the exploration level, other more critical attributes may be mapped as a product of detailed work on more closely spaced datum points with complete sample and electric-log control. The clastic ratio-sand shale ratio map is merely the easily derived first step which serves to orient and frame the setting of any specific problem.

Choice of stratigraphic interval to

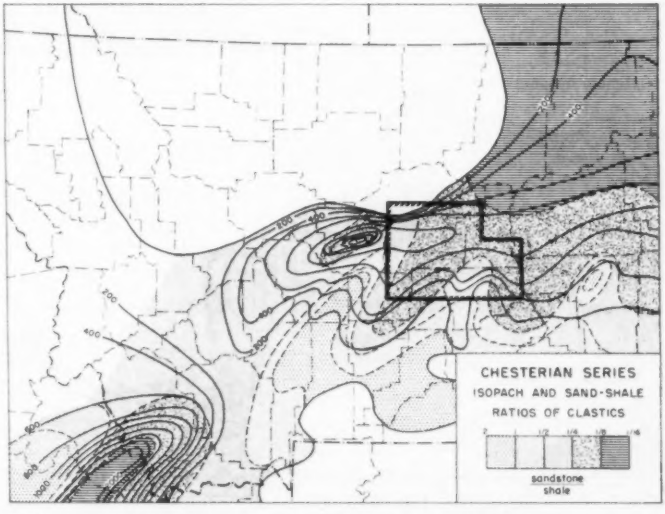


Fig. 3—Isopachs (200-ft. interval) and sand-shale ratios (indicated by patterns) of the clastics in the Chesterian Series of the Montana area. Outline indicates area covered by Figs. 4 and 5.

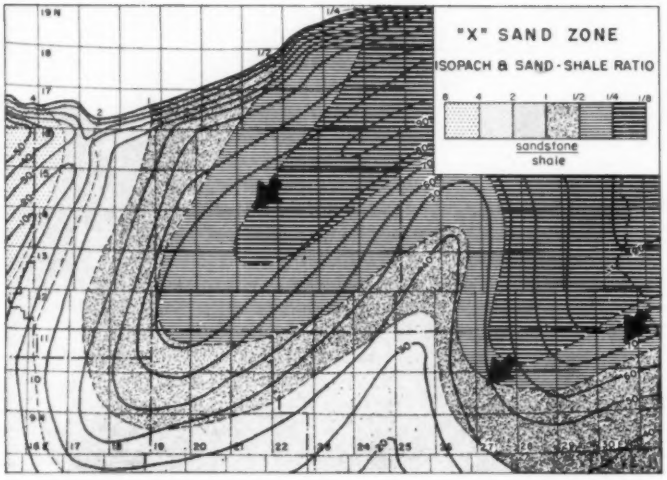


Fig. 4—Hypothetical map of a fictitious zone in the Chesterian of Central Montana, showing isopachs (10-ft. interval) and sand-shale ratios (indicated by patterns). Arrows indicate assumed position of present production.

be mapped.—Quantitative facies mapping may be applied to any stratigraphic interval that can be correlated with assurance over the area of interest.

In general, the thickness of stratigraphic interval required is directly proportional to the size of the area to be covered. Regional studies involving major portions of a continent are normally based on time-rock units such as systems or series. Occasionally, operational units of rocks defined by regional unconformities or marked changes in lithologic character may be traced and mapped over broad areas.

In either case, recognition of the vertical differentiation of the section treated is submerged and sacrificed in the interest of obtaining valid correlation. In spite of the obscuration of local detail the resulting maps have been invaluable in academic interpretations of geologic history and continental evolution, while, to the exploration geologist, they provide the means of primary evaluation of whole provinces.

Within localized areas of intensive exploration, facies mapping may be applied to specific small units such as groups, formations, members, or individual oil sands. Under some circumstances valuable results are obtained by mapping small time-rock units such as stages, or thin biostratigraphic units defined by paleontologic horizons. In each case, however, local interpretations are significantly improved by reference to the regional picture as developed on broad-scale maps of thicker intervals.

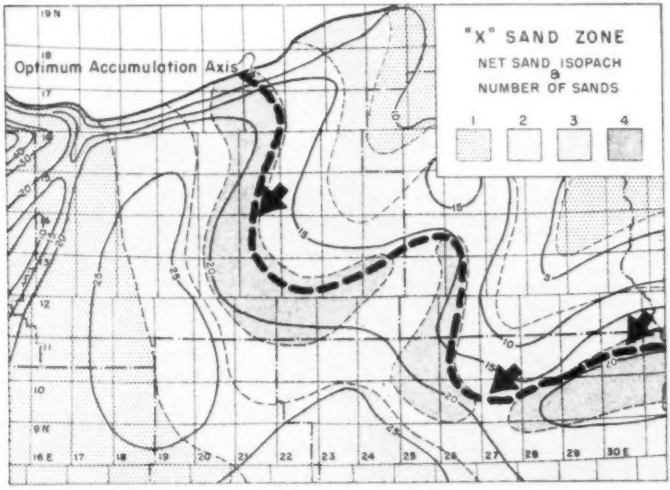


Fig. 5—Hypothetical map of a fictitious zone in the Chesterian of Central Montana, showing net thickness of sand (5-ft. isopach interval) and number of discrete sand bodies present in the zone (indicated by patterns). Arrows indicate assumed position of present production.

Hypothetical Example of Applied Stratigraphic Analysis

In order to make some of these points more pertinent to exploration problems, let us examine a hypothetical example of practical facies analysis. We will assume that a company has an opportunity to take leases in a Central Montana area which has yielded limited amounts of oil from Mississippian sandstones. The prospective play is based on extension of the Mississippian production but it remains to be determined whether or not such extensions are probable, and if so, the directions in which they should be sought.

Analysis of the regional map.—Examination of the regional Mississippian facies and isopach map (Fig. 1) makes possible an orientation of the local area in question in terms of the big picture of which it is a part.

The map indicates that conditions in the Central Montana area are markedly different from those in other parts of the Rocky Mountain province that produce Mississippian oil. Instead of the broad areas dominated by limestones with low rates of isopach change which feature the pattern to the north and south, the Central Montana situation appears to be much more complex.

The area is characterized by a fairly rapid increase of thickness along a roughly west-east trend which serves to connect the geosynclinal areas on the west with the Williston basin on the east. Within this thickened belt even the generalized facies pattern indicates a degree of concordance between facies and isopachs, suggesting a relationship between the character of the sediments and the tectonics of the area.

Before proceeding further with the analysis it is obvious that exploration techniques applied to the Mississippian of Central Montana should not necessarily be those found useful in the producing areas to the north and south. A better understanding of the problem cannot be gained, however, without focusing on greater detail by increasing the scale of the map, reducing the thickness of the interval considered, and multiplying the number of control points used.

Second level of analysis.—Investigation of Mississippian production in Central Montana shows that sand-

(Continued on page 117)

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(continued from preceding page)

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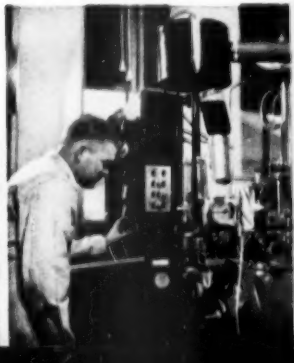

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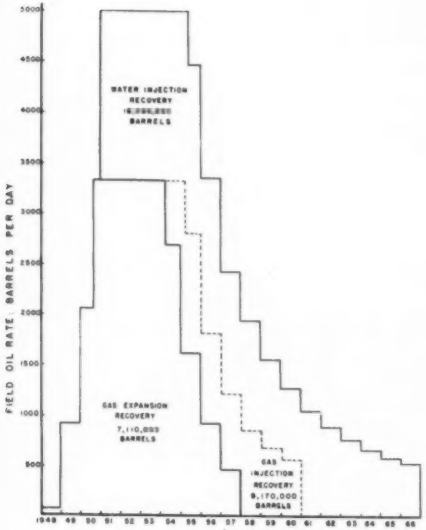
FIELD OIL RATE - BARRELS PER DAY
WATER INJECTION RECOVERY BARRELS
GAS EXPANSION RECOVERY 7,110,000 BARRELS
GAS INJECTION RECOVERY 9,170,000 BARRELS

Fig. 1—Comparative oil recovery, Bend conglomerate.

ENGINEERING STUDY REPORT:

Worsham-Steed Field

Jack County, Texas

From this study it can be concluded that a successful water-injection program for the field can be initiated and carried out. The field will need to be unitized, at least the north and south parts, to economically install the system. Since most of the leases are relatively small, it will be difficult to start even a pilot-injection well without moving oil across property lines.

IN the short space of 2½ years Worsham - Steed field, located about 10 miles southeast of Jacksboro in Jack County, North Texas, has grown from a 3-well pool to a 130-well pool. Monthly production during this period has increased from some 2,000 bbl. to over 100,000 bbl.

In a preliminary engineering report prepared for the Worsham-Steed Engineering Committee* by Davison Petroleum Reservoir Engineering of Robinson, Ill., the advantages to be obtained by early application of a gas or water-injection program in this field are forcibly demonstrated.

It is calculated that 7,110,000 bbl. of oil may be recovered from the field by primary production. Recovery by gas injection is calculated to be 9,170,000 bbl. By a water-injection program the field should recover 16,000,000 bbl. of oil. These comparative oil recoveries are shown graphically by Fig. 1.

*Members: John H. MacDonald, chairman, Star Oil Co., Dallas; Warren O. Johnson, Republic Natural Gas Co., Dallas; G. Scott Hammonds, First National Bank Building, Dallas; R. H. Parks, Sunray Oil Corp., Midland, Tex.; Kenneth Smith, Champlin Refining Co., Enid, Okla.; R. L. Freeborn, Continental Oil Co., Wichita Falls, Tex.

Introduction

The Worsham-Steed reservoir, discovered in April 1942, is a stratigraphic trap, with permeability limitations apparent to the north, east, and west. To the south, in the gas-cap area, drilling has not progressed far enough to establish definitely the limits of this gas cap. Oil production is obtained from the Bend conglomerate at depths from —3,320 to —3,542 ft. subsea, or 222 ft. of structural closure. The gas cap covers the south part of the area as shown on Fig. 3.

Present oil allowables on the wells are based 50 per cent on wells and 50 per cent acreage, with a maximum oil allowable of 60 bbl. per day. Limiting produced gas-oil ratio is 2,000 cu. ft. per barrel of oil. During March 1951, 125,000 bbl. of oil was produced from the field, or an average of about 4,000 bbl. per day. There were 57 wells flowing, and 55 pumping. The June 1951 proration schedule gives allowables to 82 wells.

Producing mechanism to date has been gas expansion, with possibly some little effect from the gas cap on nearby wells. None of the wells produce water and since the lowest structural wells did not penetrate water-bearing formation, it is assumed that no water drive exists in the field.

Oil wells are completed for initial potentials from 25 to 1,000 bbl. of oil per day, averaging about 200 bbl. Except for wells completed near the gas-cap area, initial gas-oil ratios have been normal, or about the solution gas-oil ratio of 511 cu. ft. per barrel of oil. Gravity of the oil is 41°.

Several productivity - index tests have been made. The maximum measured productivity index was 0.8, the average for the field appears to be on the order of 0.4. This latter figure has been used in calculations of future oil-producing rates.

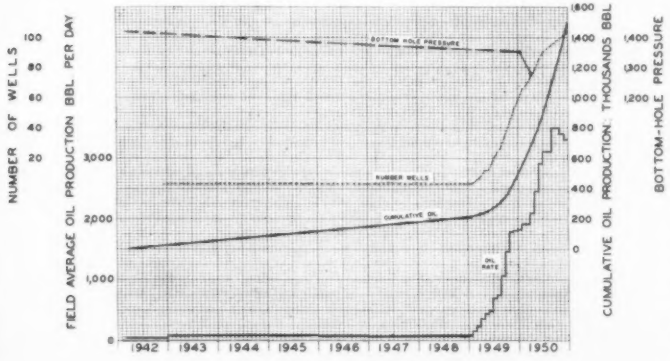

Fig. 2—Production data.

The Oil Reservoir

The oil - producing reservoir at Worsham-Steed is the Bend conglomerate found at an average depth of 4,600 ft. (—3,400 ft. subsea). The reservoir is a long, almost U-shaped stratigraphic trap. The major axis is north and south. The field is almost 5 miles long and about 1½ miles wide. The base map used was prepared from a map furnished by Star

Oil Co. As shown in Fig. 3 the limits of the field are apparently defined in all directions except the gas-cap area to the south.

Reservoir structure.—The structural map, Fig. 3, was made from data on the electric logs. Core analyses were available on nine wells for correaltion of oil-pay thickness. The oil pay on penetrated sections varied from 3 ft. near the pool limits to about 40 ft. in some central portions. The net average oil pay is estimated to be at least 15 ft.

Early development of the field has generally been in two separate areas. These are around the three original wells and just north of the gas-cap area. For this reason there was some doubt that the two areas were connected. Recently, however, enough wells have been completed between these two areas to indicate that there is a definite connection within the oil reservoir between the two ends of the field.

Reservoir formation characteristics. There are only nine core analyses available from a relatively small area in the field. The average formation characteristics are taken from these wells even though it seems apparent from electric-log correlation that they are better than average wells.

The weighted average porosity of 13.6 per cent of formation volume was obtained from these nine analyses. Average of 198 permeabilities greater than 0.1 is 45 md.

The connate water of 29 per cent was obtained from the data furnished by Sunray Oil Corp. recovery tests, Table 7.

Reservoir content.—The oil reservoir area covers at least 3,409 acres. This figure is from the October 1, 1950, proration schedule. The area shown in Fig. 3 covers 3,750 acres.

Based on 3,750 acres and a 15-ft.

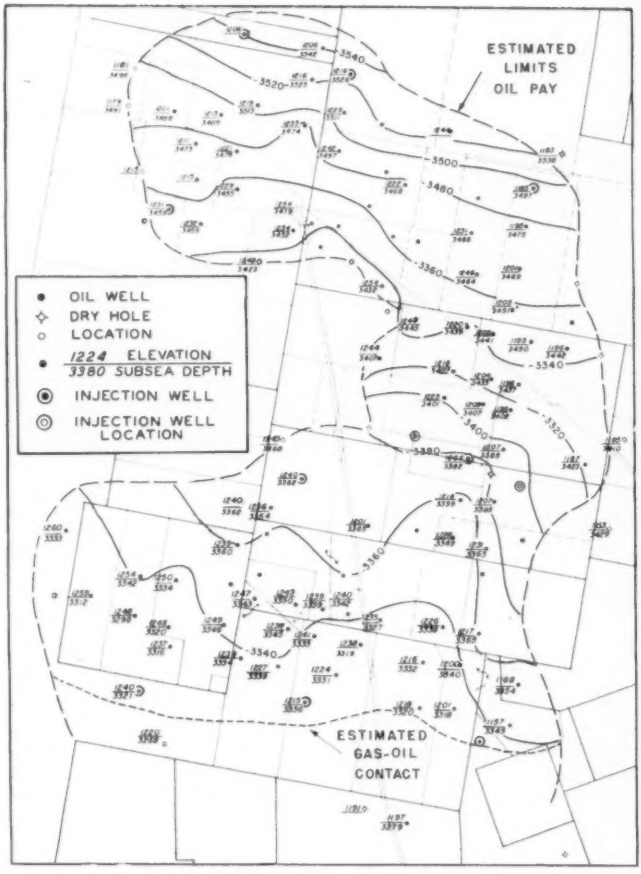

Fig. 3—Contours on top of oil pay.

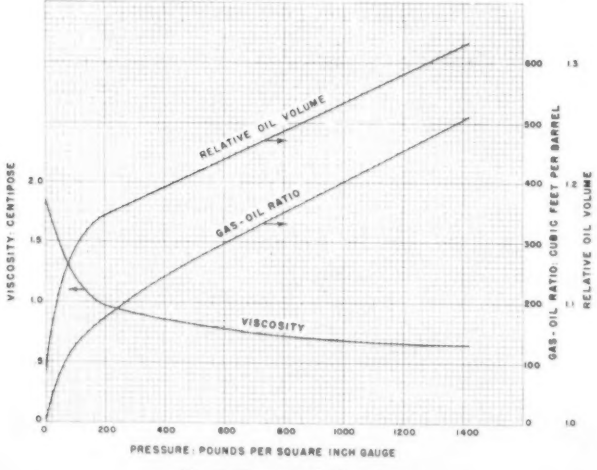

Fig. 4—Reservoir fluid analysis.

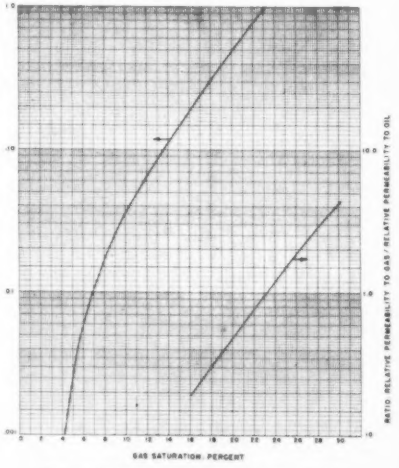

Fig. 5—Relative permeability ratio, K_{rg}/K_{ro}.

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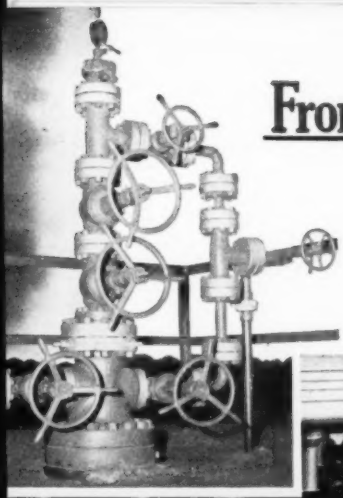

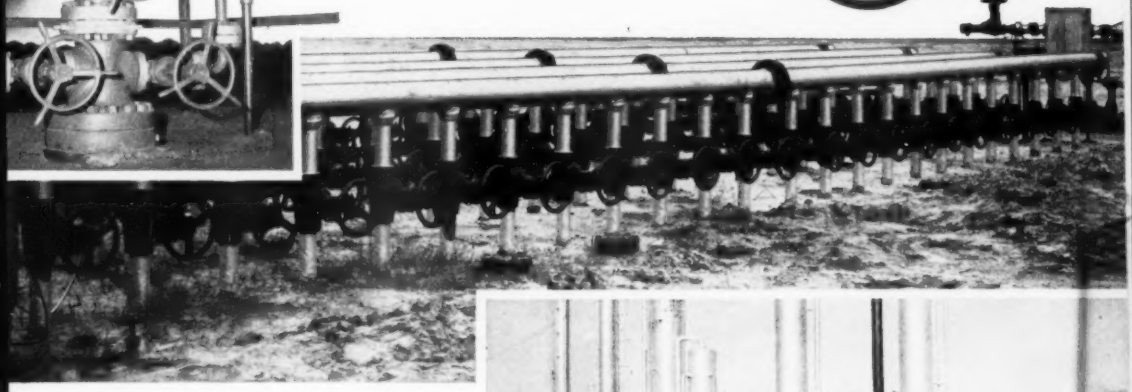

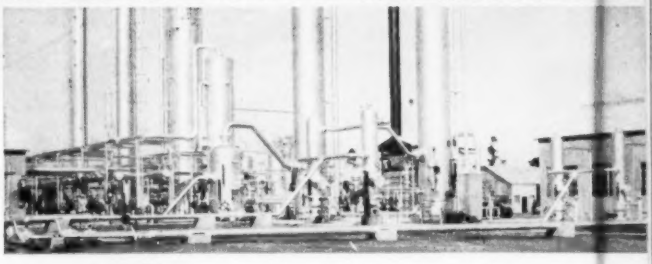

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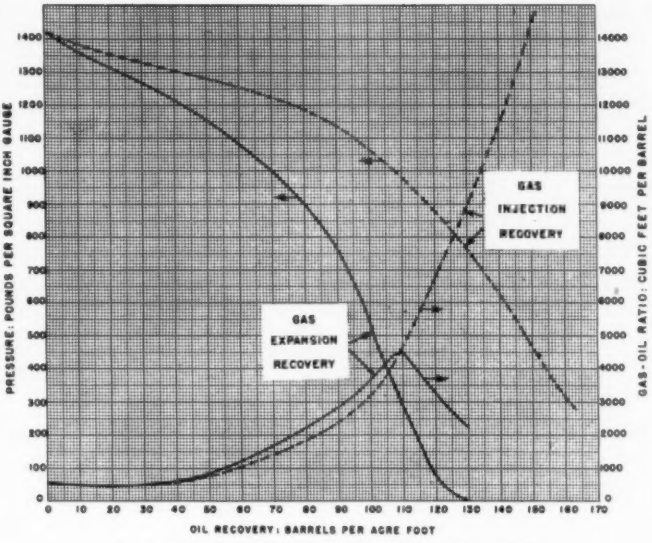
PRESSURE: POUNDS PER SQUARE INCH GAUGE
GAS-OIL RATIO: CUBIC FEET PER BARREL
OIL RECOVERY: BARRELS PER ACRE FOOT
GAS INJECTION RECOVERY
GAS EXPANSION RECOVERY

Fig. 6—Gas-expansion recovery and gas-injection recovery.

net sand thickness, the oil reservoir has a volume of 56,250 acre-ft. and originally contained 32,006,250 bbl. of stock-tank oil.

Bottom-hole pressures.—Two bottom-hole-pressure surveys have been made on several wells in the field. The first of these, on January 15, 1950, included 11 wells. The average bottom-hole pressure at —3,320 ft. subsea was 1,351 psi. at this time.

The second survey, on April 3, 1950, included 10 wells and the average of these was 1,282 psi. Since only three of the wells included in this survey were measured previously, the pressure drop indicated may not be average conditions in the oil reservoir.

The bottom-hole pressure in Worsham-Steed is low for the oil-producing depth. Normal bottom-hole pressure for this depth should be over 2,000 psig.

Primary Production

Reservoir-fluid characteristics.—Reservoir fluid was sampled January 14, 1950, in G. S. Hammonds 1 Dickenson. This sample was taken about 1 month after the well was completed from a depth of 4,520 ft. (—3,303 ft. subsea). The oil-pay interval in this well is 4,569 to 4,595 ft.

At the time the sample was taken the shut-in reservoir pressure was 1,395 psi. The measured bubble-point pressure of the reservoir oil was 1,205 psig. at 140° F.

The reservoir-fluid data have therefore been extrapolated to a pressure of 1,420 psig.

At this pressure there is 511 cu. ft. of gas in solution per barrel of residual oil. The relative oil volume is 1.317 and the viscosity of the reservoir oil at initial conditions is 0.65 cp.

These data are shown graphically in Fig. 4 and in Table 1.

The relative-permeability data used are average data corrected for connate water of 29 per cent.

Reservoir performance.—Reservoir performance has been calculated using the above data and are shown in Fig. 6 and Table 3. From these curves it seems apparent that the present oil rate of 100,000 bbl. per month can be maintained until 1954. After that time the oil-production rates will decline until January 1, 1958, when the field rate is calculated to be 400 bbl. per day. The cumulative oil production at this time is calculated to be 7,110,000 bbl.

Gas Injection

Gas-injection oil recovery has been calculated as shown in Table 5 and Fig. 6.

In these calculations it was assumed that 75 per cent of the produced gas was injected. From these calculations it can be seen that the present oil rate can be maintained longer. The limiting factor on a gas-injection program is the produced gas-oil ratio. As the produced gas-oil ratio increases the compressor plant must be increased to maintain a given oil rate.

Usually an arbitrary gas volume is chosen when installing a gas-injection plant and the injection volumes will remain nearly constant. If no gas is vented, the oil rates must be curtailed as the gas-oil ratios increase.

The calculated recovery by this gas-injection program is 9,170,000 bbl. of oil.

The cost of a gas-injection program would be similar to the cost of a water injection for a field of this size. Because of the added recovery of the water-injection program no

TABLE 1
Reservoir Fluid Analysis, Gas-Oil Ratio, Viscosity, and Relative Oil Volume Vs. Pressure at 140° F.

Pressure (psi.)	Gas-oil ratio (cu. ft./bbl.)	Viscosity (cp.)	Relative oil volume, reservoir bbl. per bbl. stock tank
1,420	511	.65	1.317
1,300	479	.65	1.302
1,200	453	.66	1.290
1,100	427	.67	1.278
1,000	400	.68	1.267
900	374	.70	1.255
800	348	.72	1.243
700	322	.75	1.231
600	296	.78	1.219
500	270	.82	1.207
400	243	.86	1.195
300	210	.91	1.183
200	174	.97	1.171
100	127	1.20	1.143
0	0	1.83	1.041

TABLE 2
Relative Permeability Ratio, Relative Permeability to Gas, Relative Permeability to Oil

Gas saturation, per cent pore space	Relative permeability ratio (Krg/Kro)
5	.0034
8	.0163
10	.035
15	.145
20	.490
25	1.48

This curve taken from average Krg/Kro data and corrected for 29 per cent connate water.

TABLE 3
Gas-Expansion Oil Recovery and Gas-Injection Recovery Using 75 Per Cent of the Produced Gas

Pressure (psi.)	Oil recovery, bbl. per acre-ft.		Gas-oil ratio, cu. ft. per bbl.	
	Gas expansion	Gas injection	Gas expansion	Gas injection
1,420	0	0	511	511
1,400	3.5	6.0	505	505
1,350	12.5	21.5	500	500
1,300	23	42	495	520
1,200	43	76	530	1,650
1,100	57	96	1,200	2,800
1,000	70	108	1,700	4,200
900	80	118	2,200	6,200
800	88	127	2,700	8,100
700	93	135	3,100	10,100
600	98	142	3,500	11,800
500	102	148	3,800	13,800
400	105	154	4,200	16,000
300	109	161	4,500	.....
200	114	.....	4,000	.....
100	119	.....	3,400	.....

TABLE 4
Productivity Index vs. Pressure

Pressure (psi.)	Productivity index
1,420	.4
1,300	.308
1,200	.244
1,100	.197
1,000	.170
900	.133
800	.111
700	.095
600	.081
500	.070
400	.063
300	.057
200	.045
100	.028

It doesn't have to be this way...

WATCHING THE BOSS TRYING TO SNEAK IN SO HE CAN ENJOY THE LAST FEW HOURS OF HIS VACATION BEFORE THE GANG GETS TO HIM WITH TWO WEEKS OF ACCUMULATED GRIEF.

WAIT TILL HE HEARS ABOUT THAT STRIPPING JOB THAT'S BEEN GOING ON AT MINCKLER 5.
AW, THAT AIN'T HALF BAD, WATCH HIM DROP DEAD WHEN HE FINDS THAT BUSTED RODS HAVE PUT THE O'CONNOR LEASE A WEEK BEHIND ALLOWABLES.
THE ONLY THING THAT HASN'T GONE WRONG AROUND HERE IS ME. I JUST KEEP ON PRODUCIN'

It can be like this!

WHAT HAPPENED WHILE YOU WERE GONE? NUTHIN! THESE FREE PUMPS RAN JUST AS GOOD AS IF YOU WERE HERE. SURFACED NO. 8, INTAKE WAS PLUGGED, BUT THE WELL WASN'T DOWN MORE THAN 3 HOURS AND WE MADE THAT PRODUCTION UP EASY BEFORE THE NEXT DAY.

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It's easy to figure why there is no slump in production during the vacation season if your property is equipped with Free Pumps.

Imagine how simple it is to cover vacation schedules when the relief pumper has to make only *one stop* to check all wells on a lease. There, at the central power controls, he observes, adjusts, and regulates the pumping of every well. There, also, is where he takes care of all engine maintenance for the entire lease.

Even if a well goes off, he can round-trip the bottom hole pump—the Free Pump—and it takes less than one hour of his time.

It is in ways like these that Free Pumping multiplies the effectiveness of your operating labor. They explain why you get maximum flexibility in arranging vacation schedules so production won't suffer. They explain, too, why Free Pumps will lower your pumping operating costs by 25% to 50%.

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cost figures have been prepared for the gas-injection program.

Water Injection

Several types of water-injection patterns were studied but the pattern shown in Fig. 3 seems the most economical and practical. With this pattern only two injection wells need be drilled.

Since the indicated productivity index of the wells is low, some of the better wells should be chosen as injection wells to provide more intake capacity. It would be desirable to drill new injection well; however, the drilled wells have a known capacity and hence a water injection rate can be calculated. New wells close to the edge of the field possibly might not have the capacity to take desired amounts of water.

The pattern shown would allow either end of the field to be operated independently of the other. However, to obtain the full benefit of a water-injection program the whole field should be unitized.

Several shallow water sands on the electric logs indicate that an adequate supply of water is available. These water sands, from 700 to 2,100 ft. depth, should be tested as a source of supply by someone familiar with water-well completion. The water supply should be tested to determine its compatibility with the formation water. About 21,000,000 bbl. of water will be required under the outlined program; about 11,000,000 bbl. of this will be required the first 4 years.

TABLE 5
Permeability and Capacity Distribution

Cumulative thickness (per cent)	Cumulative capacity (per cent)	Permeability (md.)
0	0	475
1	10	390
2	18	320
5	35	225
10	54	143
20	76	69
30	88	35
40	94	21
50	97.5	13
60	99.0	6
70	99.9	2

TABLE 6
Water Cut vs. Oil Recovery

Oil recovery (bbl./ac.-ft.)	Water cut (per cent)
0	0
50	2
100	18
150	40
200	62
250	77
300	87
350	94
400	98

Performance under water injection. In the calculations used it has been assumed that the field will produce at 100,000 bbl. per month until the end of 1950. At that time water is started into the formation at the rate of 10,000 bbl. per day. The field oil-production rate could be increased to 5,000 bbl. per day and maintained until 1955. The injection rate would be increased to and maintained at 15,000 bbl. per day.

During the initial stages the injection rates should be adjusted to maintain bottom-hole pressures about 1,400 psi. It will require 6,585 bbl. of injected water to replace 5,000 bbl. a day of stock-tank oil.

Under the outlined water-injection program the ultimate oil recovery is calculated to be 16,000,000 bbl. This is an increase of 8,890,000 bbl. over the amount to be produced by primary means alone. This added recovery could be obtained by the end of 1966. Water-injection oil recoveries have been calculated from the oil in place and the permeability-capacity distribution curves.

The following table shows the advantages in productivity and ultimate recovery to be gained by early application of pressure maintenance:

Pressure (psi.)	Oil viscosity (cp.)	Formation volume factor	Relative ultimate recovery	Average P.I. (B./D./psi.)
1,400	0.65	1.317	100	0.4
700	0.75	1.251	95	0.095
100	1.20	1.143	87	0.028

The water-injection system. — As shown in Fig. 3 the proposed injection pattern will require 11 injection wells. At a depth of 4,600 ft. the maximum injection pressure should be about 4,600 psig. This will require about 2,500 psi. surface pressure. If the reservoir pressure is maintained at 1,400 psi. there is 3,200 psi. differential for water injection. If the average injection well has a productivity index of 0.4, then the average injection well should take 1,280 bbl. per day with 3,200 psi. differential pressure on the formation.

On the two new wells it is recommended that the formation be cored, analyzed, shot, and cleaned out prior to injection. Pipe (5½-in.) should be cemented in the well from top to bottom. Even if the well is cemented to the top it would be advisable to inject water through tubing with a packer set above the oil pay.

Costs.—The costs of the above-outlined system can be estimated with fair accuracy, even though the actual water source is not known. The major items will be the injection wells, injection plant, and injection lines. It should be pointed out that early application of water injection will prolong the flowing life of these wells.

COST ESTIMATE

Water-injection plant and water supply:		
2 injection wells at $40,000		$80,000
4 water supply wells at $20,000		80,000
Water-injection plant to handle 15,000 bbl. of water per day at 2,500 psi.		60,000
5,500 ft. 4 in. cement-lined pipe at $1.00	$5,500	
8,900 ft. 3 in. cement-lined pipe at $0.75	6,675	
30,400 ft. 2 in. cement-lined pipe at $0.40	12,160	
		24,335
Ditch and backfilling at $0.20		8,960
Meters and fitting at injection wells		11,000
		$264,295
Miscellaneous and contingencies		26,430
Total		$290,725

Additional costs would be costs of unitization and gathering lines for the produced water.

Recommendations

Preliminary:

1. That tests be made on the water sands in the north part of the field by a competent water-well drilling contractor.

2. That a pilot flood be started on one well to determine necessary injection pressures.

3. That all or part of the field be unitized.

4. That bottom-hole pressures be run on key wells every 6 months and all wells once a year.

5. That accurate production tests be made on every well every month for oil and water production and gas-oil ratio.

After injection is started:

6. That oil be produced from the individual wells in manner which will result in a balanced flood pattern.

7. That complete and accurate records be maintained on oil production, water production, and injection well-head pressures and volumes.

8. That a periodic analysis be made of reservoir performance to obtain maximum oil recovery.

TABLE 7—SUNRAY OIL CORP., TULSA CAPILLARY LABORATORY RECOVERY TESTS, WORSHAM-STEED FIELD, G. S. HAMMONDS ROSE NO. 2 WELL

Core No.	Depth (ft.)	Permeability to brine	Porosity pore space (per cent)	Connate water (per cent)	Oil in place recovery (per cent)	Residual oil saturation per cent pore space	Stk.-tank Oil recov. bbl./ac. (FVF=1.3)
3	4,604.5	5.5	12.2	32.6	49.2	34.3	241
5	4,606.5	0.4	10.2	36.7	54.0	29.1	205
8	4,609.0	3.5	12.9	29.0	59.0	29.1	329
9	4,609.5	15.9	15.5	25.5	62.4	28.0	430
10	4,610.5	9.2	15.2	30.2	57.4	29.7	363
11	4,611.5	11.6	15.5	24.5	54.6	34.3	381
13	4,613.5	20.7	16.1	19.7	61.8	30.7	477
14	4,615.5	10.6	15.0	29.2	59.4	28.8	376
15	4,615.5	24.9	15.4	24.2	64.4	27.0	449
17	4,617.5	2.1	12.9	18.4	54.9	36.8	345
18	4,618.0	12.3	14.8	17.7	57.7	34.8	419
19	4,619.5	2.0	10.6	32.4	55.5	30.1	237
20	4,620.5	0.8	8.3	29.9	57.2	30.0	199
21	4,621.5	0.6	11.6	38.4	31.8	42.0	136
22	4,622.5	1.1	12.7	39.9	41.3	35.3	188
23	4,623.5	0.4	7.2	38.0	40.9	36.6	109
Average		7.6	12.9	29.1	53.8	32.3	305

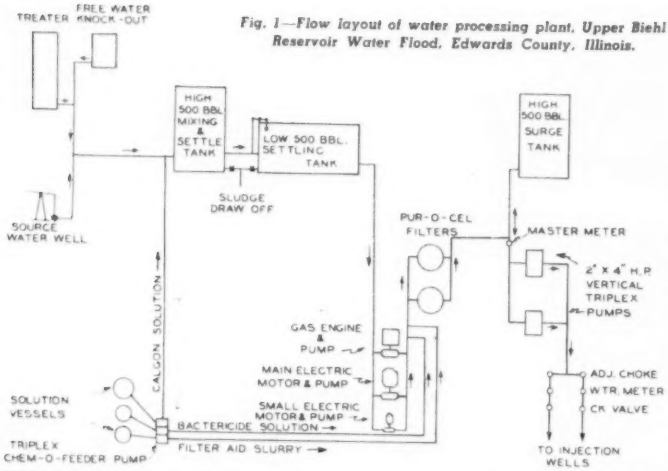

Fig. 1—Flow layout of water processing plant, Upper Biehl Reservoir Water Flood, Edwards County, Illinois.

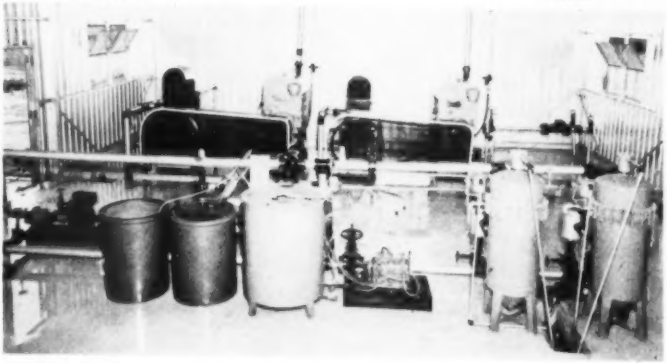

Fig. 2—Equipment arrangement in the water plant operated in Grayville, Illinois, field. Filter process is located in the foreground with injection pumps in the background.

Illinois Water-Flood Plant Uses Closed Water System

Plant designed for uninterrupted operation by setting standby pumps and engines not only for the high-pressure injection system but also for the filter plant

by Cecil A. Hamman*

ONE of the most recent water floods of the vertical-migration type, induced by injection of water into the water zone of an oil-bearing formation in Illinois, is the Upper Biehl Reservoir Water Flood in Northwest Grayville field, Edwards County. This flood was put into operation during December 1950 by S. C. Yingling Oil Operations (operator), Walter Duncan, and Sam Lewis & Sons.

The flood required a water plant that was initially capable of handling 500 bbl. of water per day for one injection well, and that could be expanded at a later date to have a handling capacity of 1,000 to 1,300 bbl. of water per day to supply two injection wells. The average mean depth of the injection wells was 1,975 ft. and eventually a surface pressure of approximately 1,000 psi. would be required to inject the water into the reservoir.

A source of water from a Pennsylvania sand 800 ft. deep was developed. Water produced with oil from the deeper pays, as well as that produced from the Biehl formation in the locality of the plant, was to supplement the water supply. Chemical analyses of these waters showed them to be compatible if a closed system was maintained. The only water treatment that would be required would be the addition of Calgon, a hexametaphosphate sequestering agent for the prevention of precipitation of iron and/or a carbonate, plus a bactericide to prevent the growth of anaerobic bacteria.

Fig. 1 shows the flow diagram of the water plant.

Produced water from the free water knockout and treater as well as the water from the source water well enters a common pipe line connected to a high 500-bbl. tank. A Calgon solution is injected into the water stream just prior to its entry into the high 500-bbl. tank which serves as the chemical mixing and settling tank. Any oil scum that might be produced from the shallow water well or that might be carried over from the free water knockout or treater floats to the surface of this tank.

Flow of Water

The water flows from this tank into the low 500-bbl. settling tank for additional settling time prior to filtering. The water is pumped from the low 500-bbl. settling tank by electrically driven turbine-type pumps through the filters, a master water meter, and into the suction side of the high-pressure 2 by 4-in. Worthington vertical triplex pumps. It is to be noted that a high 500-bbl. tank is also connected to the suction side of the high-pressure pumps to act as a surge tank as well as a reservoir of filtered water in case of emergencies. The high-pressure pumps are powered with Waukesha natural-gas engines. Water leaving the high-pressure pumps enters a manifold and then passes through an adjustable choke, water meter, check valve, and into a high-pressure line connected to an individual injection well.

The filter plant consists of two ℠Proportioneers℠ Model FAB-19 Pur-O-Cel diatomaceous earth filters, the first to be installed in an Illinois water-flood plant. These filters are quite small and easily handled and require a relatively small floor area considering their high capacity. Each filter consists of cylindrical steel tank divided into two compartments by a filter septa carrier plate. In the lower portion of the filter or raw-water compartment are mounted

*Consulting petroleum engineer, Evansville, Ind.

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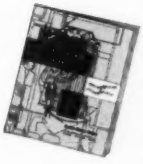

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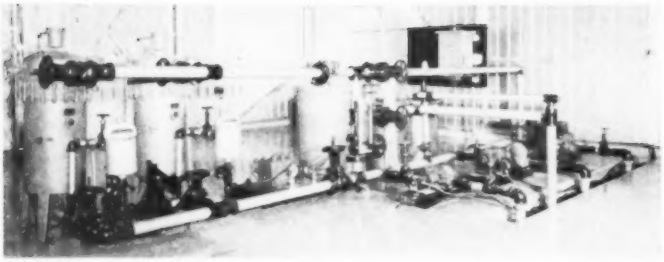


Fig. 3—Filter equipment for the Grayville field water plant viewed from the opposite side to that in Fig. 2.

nineteen 2⅞ by 25-in. cylindrically shaped aluminum oxide porous filter septas, having a filter area of 26.5 sq. ft. or a total area of 53 sq. ft. for both filters. At minimum rate of flow the filter rate would be approximately 1 g.p.m. per square foot of filter area. The filter rate could be increased to 2 g.p.m. if necessary, the lower filter rate lengthens the period between backwashing the filters.

The process of filtration is essentially as follows: A slurry of diatomaceous earth is introduced into the filter influent line. This suspension passes through the raw-water compartment and is deposited on the filter septa by the flow, forming a porous cake on each septum through which the water is forced during filtration. This filter cake increases the filtering efficiency and prevents the turbid particles from entering the pores of the aluminum oxide stones and thereby contaminating them.

The initial coat, called the precoat, is introduced into the filter by a pot feeder. If the turbid particles were deposited continuously on the precoat surface they would accumulate on the precoat and gradually clog the openings. In the continuous body coat feeding the filter aid slurry is injected into the water as it enters the filter and is thereby mixed with the turbidity and deposited on top of the precoat. This filter aid when mixed with the sediments tends to keep the filter coat porous and thereby permits much longer runs and at higher flow rates before it becomes necessary to backwash the filters.

The length of runs depends upon the turbidity of the water. When a differential pressure builds up to 40 or 50 lb. across the filters, it is necessary that they be backwashed. At the present time the plant operates approximately 10 to 14 days before backwashing is necessary.

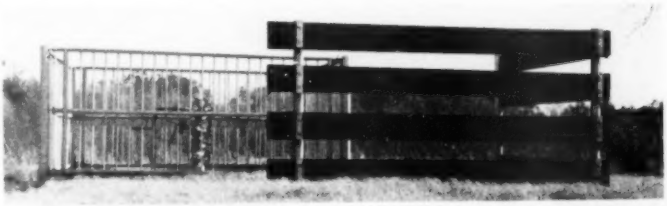
In case the filter stones become temporarily partially clogged due to careless operations, they may be acidized without disassembling the filters.

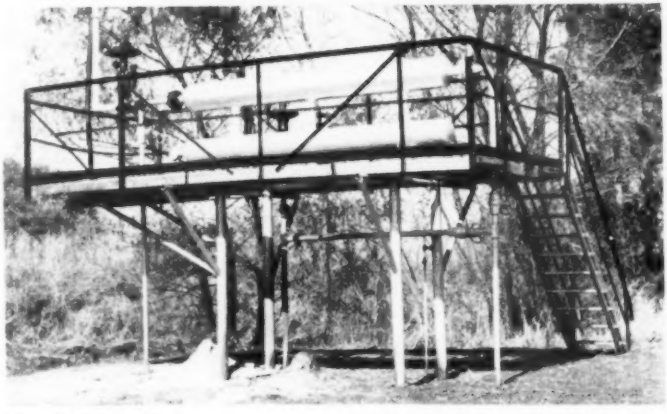
It is necessary that a continuous flow of water pass through the filters to prevent the filter cake from dropping off the filter stones. This uninterrupted flow is assured by the continuous operation of a small electrically driven turbine-type pump. The large electrically driven turbine-type pump is turned on and off automatically by a Mercoid switch installed on the low 500-bbl. tank to control the water level in that tank. The air-cooled gas-engine-driven turbine-type pump is used if additional pressure or volume is required in backwashing the filters or for emergencies when there is an electrical power failure.

A triplex Chem-O-Feeder chemical pump located in the plant pumps the Calgon solution through 85 ft. of plastic hose and injects the solution into the raw water just prior to its entry into the high 500-bbl. chemical mixing and settling tank. This same pump also injects the bactericide solution and diatomaceous earth slurry into the manifold connected to the filters.

An automatic control is installed on the high 500-bbl. filtered-water surge tank to shut down the high-pressure pumps in case the water level falls too low in that tank.

Since this is a closed system, all water tanks carry an oil seal which would cause considerable damage if the water levels in the tanks dropped low enough to permit the oil seal to be pumped into the filters or into the injection wells. Installation of automatic controls makes it possible for the plant to be attended only during normal daylight working hours. The plant was designed for uninterrupted operation by setting standby pumps and engines for not only the high-pressure injection system but also for the filter plant as described above.





Flood Protection

Operators in sections of the Lindsay, Oklahoma, fields, within flooded areas of the Washita River, use various methods to protect production equipment from driftwood during overflow periods. Upper photograph 1 shows a fender or bumper-guard installed upstream from a Phillips Petroleum Co. well. Made of heavy timbers attached to firmly anchored steel supports, this fender prevents damage to the well's christmas tree and guard fence by deflecting driftwood or other floating objects. Lower photograph shows the separator installation at a Phillips location. This support needs no fender to deflect floating logs, etc., since it is constructed suitably to withstand any loads imposed on it during floods.

Stratigraphic Analysis

(Continued from page 104)

stones in the upper Mississippian, or Chesterian, section seem to have the greatest possibilities. With this in view, an isopach-lithofacies map of the Chesterian series in Central Montana and closely contiguous areas is prepared (Fig. 2). The map serves to conform the relationship between thickness and facies suggested by Fig. 1. The areas of thickest accumulation are dominated by shales, while sands tend to be more promiment on axes of thinner deposition.

No direct relationship between the points of known production and the facies-isopach pattern is obvious on this map. Since the sandstones are the object of the investigation it is worth determining whether or not more significant patterns emerge when the clastics in the section are considered separately without their complicating admixture of limestone, dolomite, and evaporite.

Third level of analysis.—Fig. 3 shows the thickness of Chesterian clastics in the same area with greater refinement of sand-shale ratio treatment. The concentration of high sand values along positive trends is emphasized and a vague correlation is discernible between the amount of sand and shale in the section and the occurrence of oil.

Not much profit can be had from further elaboration of treatment of the entire Chesterian series at this map scale. The section contains at least three individual sands with independent relations to the depositional environments and tectonics of the area. Consideration of all three on the same map tends to produce a blurred and distorted picture which is not strictly applicable to any single sand body. At this stage in the analysis it is necessary to consider the immediate area to be evaluated and to isolate as far as is possible each potentially productive zone.

(The remainder of this discussion deals with an entirely hypothetical case which has no actual basis in fact. Any resemblance to known geologic conditions is purely coincidental.)

Fourth level of analysis.—Let us assume that sufficient data are at hand to permit the accurate correlation of one of the Chesterian sand zones throughout the area indicated by Fig. 4.

This, the "X" sand zone, is limited by key beds or electric-log markers which make possible identification of the interval across facies strike and beyond the area of significant sand content. The zone is terminated to the north by postdepositional erosion and has been affected by erosion along the western border of the map area. Elsewhere the interval is intact.

Fig. 4 is a combined isopach and sand-shale ratio map of the "X" sand

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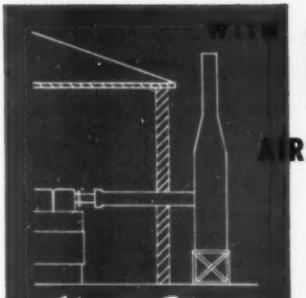

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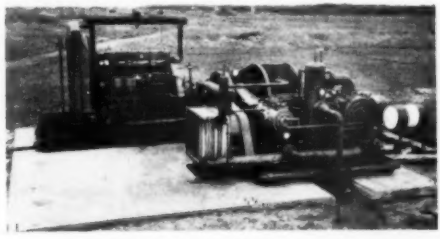

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zone. A general decline in sand values toward the northeast may be noted to be more or less inversely proportional to the thickness. Fairly close accordance of facies and thickness patterns are evident except where the interval has suffered erosion.

Prominent features are the two northeasterly trending positive noses characterized by higher sand content, and the adjacent axes of thicker accumulation dominated by shale.

Known production from the "X" sand zone lies within the belt of intermediate sand-shale values where the sand makes up from about one-half to about one-fifth of the total interval. Thus there is a degree of correlation between the map pattern and production.

However, numerous dry holes and noncommercial tests have been drilled in the same belt on what appear to be proper structural locations. The key to oil accumulation is still missing and must be sought by analysis of other aspects of the local stratigraphy.

Fifth level of analysis.—Fig. 5 is a map showing the thickness of sand in the "X" sand zone and the number of recognizable sand bodies present. Net sand thicknesses are seen to range from more than 25 ft. on the west and south to less than 10 ft. on the northeast.

All of the sand is confined to a single sandstone sheet on the west. This sheet is split into multiple sand tongues to the northeast, reaching a maximum of four discrete sand bodies along a sinuous northwest-southeast trend across the center of the map area. Only a single thin tongue persists to the northeast.

Let us assume that all known commercial production from the "X" sand zone is limited to a narrow belt roughly parallel to the northeast edge of the trend of most numerous sands. This belt marks the zone of maximum interfingering or reservoir sands with marine shales. The empirical relationships which are shown between this zone and proved production potentials suggest that, at least in this case, a genetic relationship exists. Therefore, the belt is tentative labeled the "Optimum Accumulation Axis."

The axis extends far beyond the proved areas to points where drilling locations are difficult to justify on structural data alone. However, since the sands involved pass into shales to the northeast, any trapping component which would effect southeast closure would be worthy of investigation.

Concluding Remarks

Geologists will recognize that the hypothetical case given in the above paragraphs is complicated by many fewer variables than are present in the average exploration problem. Here it is assumed that the oil is indigenous to the zone in which it is found.

Other problems will concern migration paths related to faults or unconformities. The majority of investigations will not come up with a useful correlation between stratigraphic and production patterns in so few analytical steps.

Nevertheless, stratigraphic analysis, which is initiated by review of the regional picture and is gradually refined with addition of detail until sights may be lowered on the actual goal, is capable of providing the missing clue to a rational exploration program.

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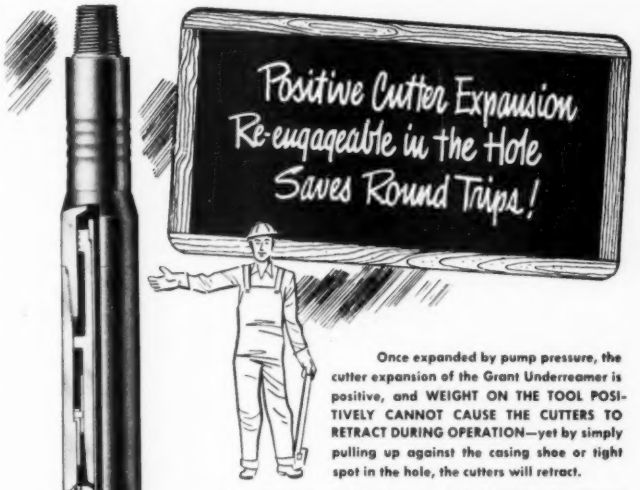

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Aerial view of Atlas Processing Co.'s plant near Shreveport, La.

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Benzene Extraction and Platforming Units

Converted refinery upgrades extraction-plant naphthas by thermal reforming of low-octane fractions followed by catalytic gas polymerization, adding 10-16 octane numbers to improve antiknock performance. Yield vs. octane-improvement data are given.

MARCH 1952 will mark the on-stream date of the new benzene-recovery unit and Platforming unit being constructed at Atlas Processing Co.'s Shreveport plant.

The new facilities, costing approximately $3,400,000, will recover 17,600 gal. per day of nitration-grade benzene in addition to upgrading saturated-type light and heavy naphthas.

Feed stock to the Shreveport plant from Carthage field, Panola County, Texas, contains approximately 4 per cent by volume of naturally occurring benzene. This condition, together with the present critical demand for benzene, led to the decision to install the benzene-recovery and Platforming facilities.

Atlas' plant is a converted refinery which upgrades extraction-plant naphthas by thermal reforming of low-octane fractions followed by catalytic gas polymerization, adding 10-16 octane numbers to improve antiknock performance. Atlas upgrades strictly on a fee per barrel basis, returning products produced to the feed-stock suppliers.

Current capacity. — Present facilities are rated for 15,000 bbl. per day of upgrading capacity. Feed stocks to date have consisted of 100°-410° F. boiling-range, sweet extraction-plant naphthas from Carthage, Texas, field. These low-sulfur naphthas have a good response to tetraethyl lead, increasing more than 20 numbers with addition of 3 cc. per gallon. Consequently, prior to 1950, octane specifications for regular-grade motor fuel were met by addition of tetraethyl lead without altering the natural chemical structure.

With competitive octane quality increasing, the postwar demand for research octane-number ratings, and greater premium-gasoline production, the need for further processing arose. Atlas' plant has been successfully meeting this need, producing both premium and regular grades of motor gasolines. Premium-grade-gasoline production has steadily increased since initial operations, accounting for more than 70 per cent of total gasoline produced during the early months of 1951. It is predicted that the trend to greater production of premium-grade gasoline will continue in the future.

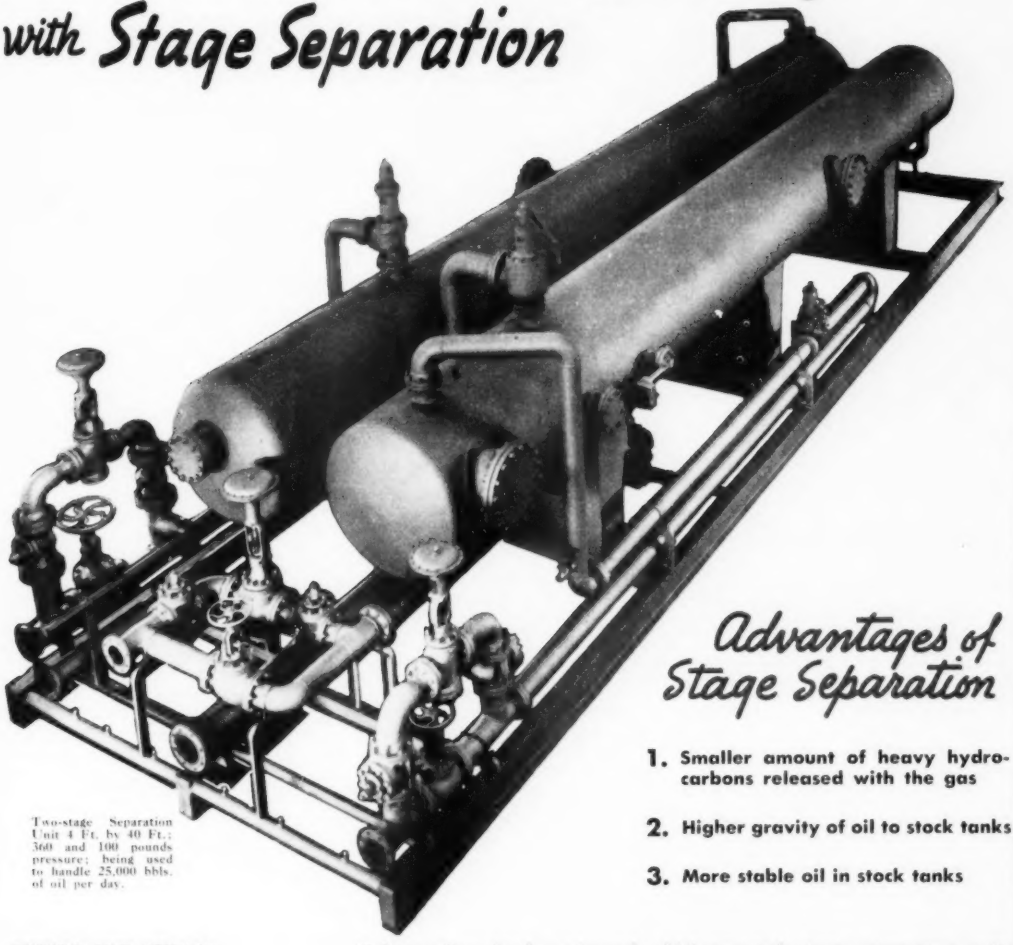
Processing Methods

Present and future processing schemes are presented diagrammatically in Fig. 1. When the Atlas refinery was converted to naphtha-upgrading operations, many of the existing facilities such as storage tanks, fractionators, gasoline stabilizers, gas-recovery, and polymerization units were adequate for operations with minor revision. Also ready to operate were the usual service facilities, steam plant, cooling water, utility systems, laboratory, warehouse, and shops.

One thermal reforming unit used in refining operations was available for immediate operation. However, the main problem was to enlarge thermal reforming capacity. This consisted of the conversion of heavy-oil cracking units to reforming and naphtha-distillation service.

This change involved the partial rebuilding and complete retubing of

More Efficient Recovery with Stage Separation



Two-stage Separation Unit 4 Ft. by 40 Ft.; 360 and 100 pounds pressure; being used to handle 25,000 bbls. of oil per day.

Advantages of Stage Separation

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2. **Higher gravity of oil to stock tanks**
3. **More stable oil in stock tanks**

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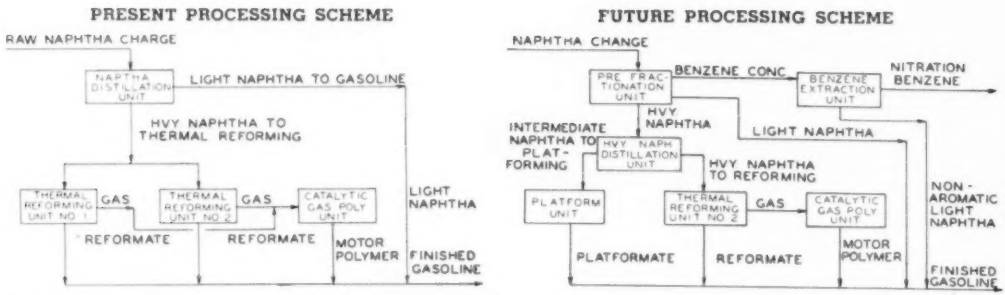


Fig. 1—Left: Flow arrangement of the Atlas plant prior to revision of its processing layout. Right: Flow scheme of the plant after incorporating Platforming and benzene-recovery units.

one large furnace for high-pressure operation for thermal reforming of 4,000 bbl. per day of low-octane naphtha.

Current operations. — The present processing scheme follows conventional pattern. Raw naphtha, stabilized to seasonal requirements, is first fractionated to separate the heavier and lower-octane fraction. The lighter fraction is used directly as finished blending stock. The heavy fraction is charged to the reforming units for upgrading—gases from the operations are charged to the catalytic gas-polymerization unit.

Motor polymer produced, together with the upgraded reformate, are finished blending stocks. Because of the very low sulfur content of feed stocks, treating is not required, although standby sweetening facilities are available should they become necessary in the future.

In order to lower transferring losses and to reduce blending time, gasoline streams leaving the processing area are mixed directly in a common transfer line to the storage tanks which are equipped for rapid blending of tetraethyl lead. Since residue gas is consumed as fuel in the plant, the only byproduct is a small amount of fuel oil produced in the reforming operation.

TABLE 1—COMPARISON OF YIELDS

	Present facilities		With new facilities	
	barrels per day	per cent	barrels per day	per cent
Raw-naphtha charge	12,000	100.0	12,000	100.0
Yields: Nitration-grade benzene	0	0	420	3.5
Upgraded gasoline	11,340	94.5	11,076	92.3
Heavier than 400° F.	60	0.5	24	0.2
Loss to gas	600	5.0	480	4.0
Total yields	12,000	100.0	12,000	100.0

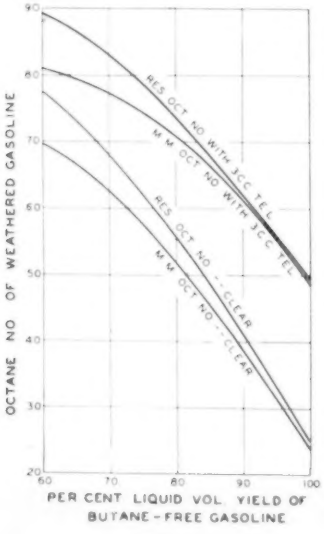
TABLE 2—OVER-ALL YIELDS VS. SEVERITY OF UPGRADING—PRESENT OPERATIONS

	Charge	Run 1	Run 2	Run 3
Yields: Gasoline, L.v., per cent	100.0	96.3	94.5	93.2
400° F. and heavier		0.3	0.5	0.8
Loss to gas (by diff.)		3.4	5.0	6.0
	100.0	100.0	100.0	100.0
Gasoline octane numbers: Research (F-1) octane No.	55.0	69.5	72.3	73.2
cc. TEL to 84.0 octane No.		2.20	1.55	1.30
cc. TEL to 88.0 octane No.			3.00	2.50

Expansion plans.—In the future processing scheme a Shell benzene extraction unit with new efficient prefractionation equipment will be installed. This equipment will recover approximately 17,600 gal. per day of nitration-grade benzene from 12,000 bbl. per day of raw naphtha.

A U.O.P. Platforming unit will replace thermal reforming unit No. 1. Platformate yield is expected to be greater than the reformate plus polymer yield it replaces and thus, as reflected in Table 1, over-all yields of approximately 1 per cent higher than those of present operation are expected.

Operating data.—Table 2 presents a summary of over-all yields versus severity of upgrading with present facilities. When producing both premium and housebrand grades, the better gasoline stocks are used in the premium-grade blend to reduce TEL requirement per gallon. Thus both


OCTANE NO OF WEATHERED GASOLINE
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PER CENT LIQUID VOL YIELD OF BUTANE-FREE GASOLINE

Fig. 2.

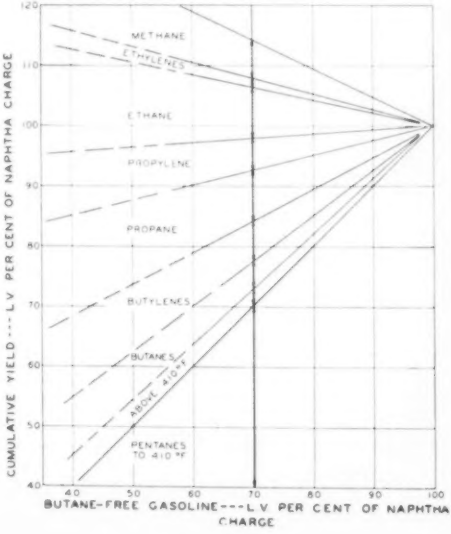

Fig. 3.

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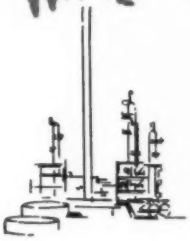

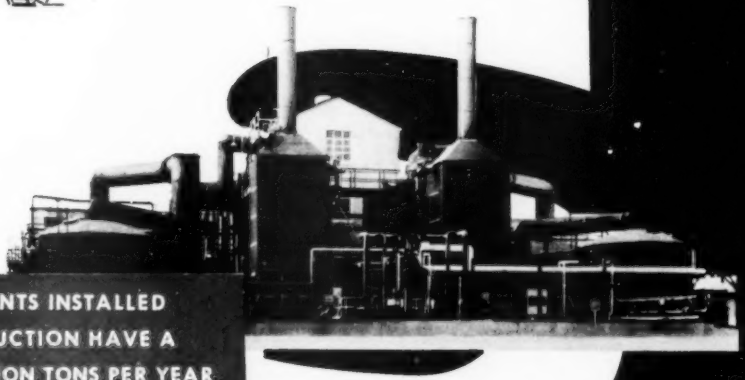

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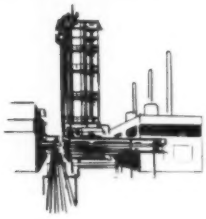

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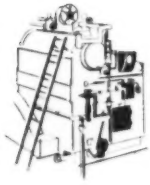

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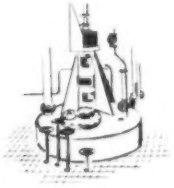

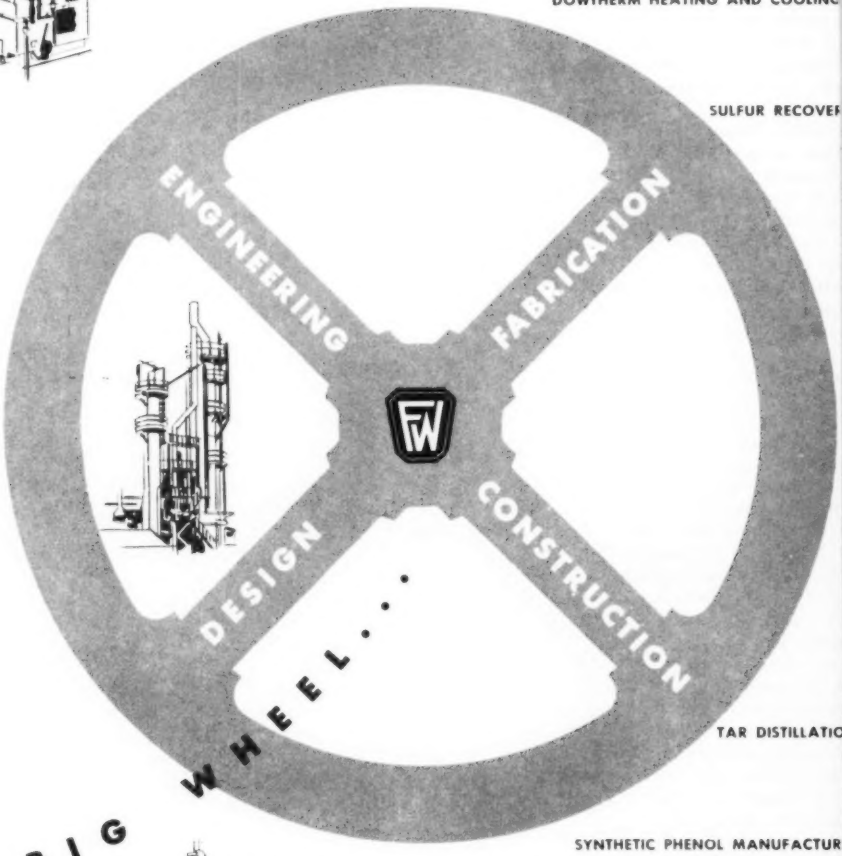

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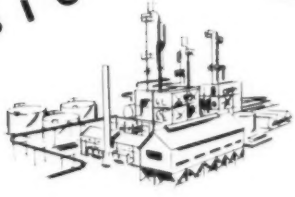

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premium and house-brand grades in the ratio of 25 to 75 respectively are produced with yields as given in "Run 2" at an average TEL requirement of less than 2 cc. per gallon.

The Atlas plant is capable of producing an even higher octane level than that given in Table 2 and currently produces both 88 and 90 research octane-number grades of premium gasoline.

Table 3 presents data on thermal reforming operations charging low-octane-number heavy naphthas. Figs. 2 and 3 are correlations of octane improvement and gas-component yields versus recovery of butane-free gasoline when thermally reforming heavy naphthas according to the data presented in Table 3. Normally 80 per cent of all propylenes and 95 per cent of the butylenes charged to the catalytic gas polymerization unit are converted to polymer gasoline. Approximately 90 per cent of the saturated butanes produced are recovered.

TABLE 3—THERMAL REFORMING YIELDS AND STOCK CHARACTERISTICS

	Run 1	Run 2	Run 3
Charges and Yields: Heavy naphtha charge, L.v., per cent	100.00	100.00	100.00
Yields: Butane-free gasoline	74.87	66.15	60.92
Recovered saturated butane	4.85	4.90	5.56
Polymer gasoline	7.67	10.12	10.52
Total gasoline	87.39	81.17	77.00
Fuel oil (above 400° F.)	1.51	2.82	3.70
Loss to gas (by difference)	11.10	16.01	19.30
	100.00	100.00	100.00

Stock characteristics	Heavy naphtha Feed	Weathered reformate	Weathered reformate	Weathered reformate
Gravity °A.P.I.	56.9	59.5	59.2	57.8
A.S.T.M. Distillation				
I.b.p.	265	87	91	87
10 per cent recovered	281	160	148	143
20 per cent recovered	287	215	191	183
30 per cent recovered	292	250	230	219
40 per cent recovered	298	267	257	247
50 per cent recovered	307	281	273	264
60 per cent recovered	316	293	287	283
70 per cent recovered	328	306	301	298
80 per cent recovered	344	327	324	320
90 per cent recovered	369	361	361	361
E.p.	422	407	413	418
Per cent recovered	98.0	96.0	96.0	96.0
Per cent residue	1.0	1.3	1.0	1.3
Per cent loss	1.0	2.7	3.0	2.7
R.v.p.		9.6	9.5	9.5
Octane numbers:				
Research (F-1) clear	25.0	62.0	72.0	77.1
+ 3 cc. TEL	49.1	79.0	85.8	88.8
Motor method (F-2) clear	23.7	57.6	65.7	69.0
+ 3 cc. TEL	48.8	74.9	78.2	80.6

Company Background

Atlas Processing Co. was formed on November 15, 1949, to meet the need in the Shreveport area for upgrading saturated-type light and heavy naphthas such as those produced from extraction plants in Carthage field. This new company purchased refining and pipe-line facilities of Atlas Oil & Refining Corp. and its converted Shreveport plant has been in operation since January 1, 1950. President of Atlas is J. B. Atkins. V. B. Chance is vice president and manager.

The Platforming unit will be built by Procon, Inc., Chicago, a subsidiary of Universal Oil Products Co. Hudson Engineering Corp., Houston, will install the benzene-extraction unit.

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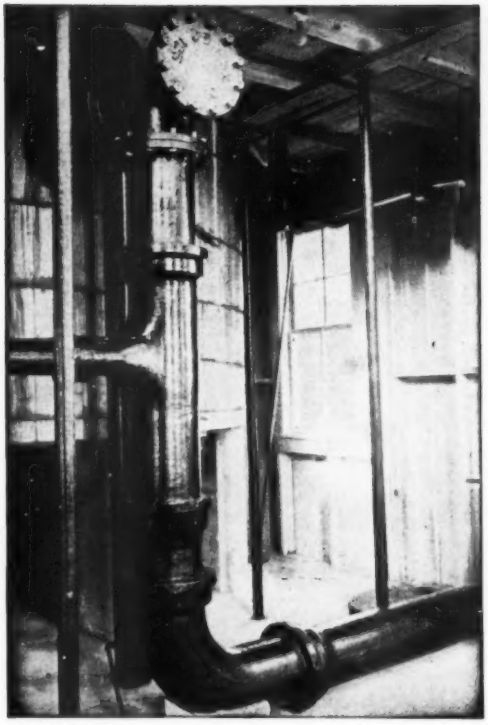

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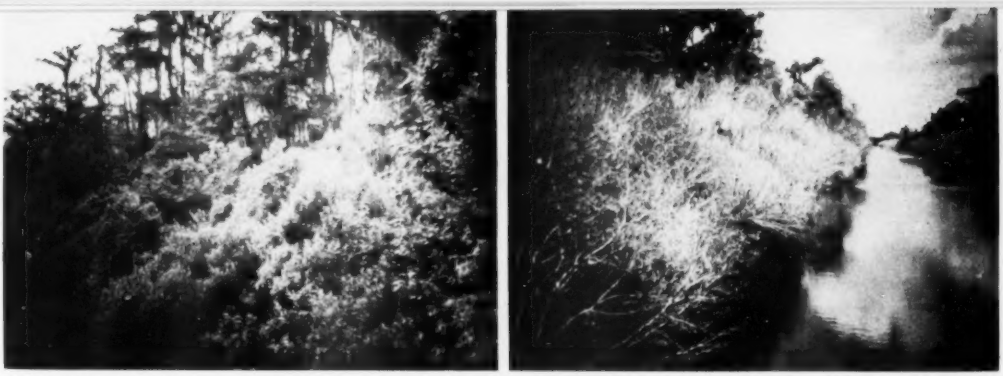

Visual evidence of what one spraying with chemical can do to reduce undergrowth and brush. Left: Dense vegetation along a United Gas Pipe Line Co. canal before chemical spraying. Right: The same bank seen from the opposite direction, 8 weeks later, after chemical spraying.

United Gas Pipe Line Co. uses new weapon in its

BATTLE AGAINST BRUSH

by Dr. A. E. Carlson*

ON a 13-acre "laboratory" along a company canal, from the dehydration plant at De Large, La., to its junction with the Falgout Canal, United Gas Pipe Line Co. is solving a menace from brush and trees, threatening the company's vital communication system.

The company owns and operates 112 miles of telephone lines across marsh lands. This means 407 acres of right-of-way to be maintained along the line between plants and offices. About 22 miles of line parallels company canals, installed on spoil banks formed by mud dredged from the canal.

On these banks, vines, brush, and trees grow at an alarming rate, imperiling the line and weaving a thicket so dense a man must literally cut his way into it. If line trouble develops, it may require several days to reach the poles, to do a 30-minute repair job. A glance at the books also showed more than $100 an acre annually charged against brush control.

In the summer of 1949, Edward C. Greco, of United Gas Pipe Line Co.'s research department, set up a program to test chemical sprays along a 13-acre stretch of canal where growth was especially heavy. Wax myrtle, marsh elder, and willows were estimated to make up 95 per cent of the growth, combined with cypress, black willow, ash, elm, sweetbay, sugar maple, buttonbush, and a thick mat of blackberries.

A strip under the telephone lines was measured off 14,000 ft. long by 30 ft. wide. The chemical used was ammonium sulfamate, better known as "Ammate" weed killer, with a reputation for nonselectivity so far as species are concerned. Spraying was done from the deck of a canal boat equipped with tank and pump and moved along close up to the spoil bank.

Results that first season were disappointing, due to inadequate coverage. It was apparent that one hose, directed from boat-deck level, could not penetrate bankside brush sufficiently to wet growth under the lines. To remedy this, a diving-board-type platform was constructed, extending 5 ft. beyond the gunwale of the boat. This placed one spray-gun operator about 12 ft. above the spoil bank while another operator sprayed nearby growth from the top of the boat cabin.

In 1950 tests, the original plots were divided into subplots of an acre each, with 80-ft. untreated check plots between. In addition, three other plots of an acre each were staked out, in brush which had not been sprayed the year before. These were used to test high-gallonage applications—300 gal. of solution per acre as compared with 150 gal. on the other sections. The amount of chemical applied per acre was the same, however, the high-gallonage sprays merely carrying twice the amount of water.

Spray was applied late in April. Besides various concentrations of Ammate, the hormone sprays, 2,4-D and 2,4,5-T were used in combination on some locations. General appearance of all sprayed areas a month later showed over-all coverage had been good and in early August a detailed evaluation of every plot was made.

In two of the subplots, one resprayed with Ammate at 1 lb. per 100 sq. ft., the other at ½ lb. per 100 sq. ft. plus a "spreader sticker" additive, the kill of all growth seemed so complete it was rated at more than 99 per cent.

The most startling evidence came from the three plots of virgin brush, sprayed for the first time in 1950. Here was proof that doubling the gallonage produced outstanding results.

On the acre sprayed with 6 lb. acid equivalent of 2,4-D and 2,4,5-T combination, an estimated 75 per cent top kill was found. Total kill was impossible to estimate until more time has elapsed. *(For a report on 2,4-D eradication of water hyacinth, see The Oil and Gas Journal, January 11, 1951, page 85.)*

Where Ammate was used at 1 lb. per 100 sq. ft., top kill was estimated at 95 per cent, and where only ½ lb. rate of the same chemical was applied, top kill was estimated at 92 per cent and a total kill including roots was estimated at 87 per cent—considered to be a remarkable performance from a single application.

On plots sprayed with the weed killer, root systems of 15 marsh elders were dug up and in every case showed an advanced stage of decay. In wax myrtles examined the same way, one out of seven showed a small amount of live, but sick-appearing, cambium near the junction of root and stem.

Cypress up to 8 ft. tall were dead in Ammate plots but not affected where the 2,4-D and 2,4,5-T was used. Willows were all dead and with decay well established in the roots. There was also much bark effect on both marsh elders and wax myrtles. Where the Ammate solution had hit the limb and run down a short distance, the cambium layer and bark was dark brown to black, with decay setting in.

Already, the switch from hand cutting to spraying is estimated to have effected a saving of 71 per cent in annual line-maintenance cost. Within another season, spraying costs are expected to represent an annual saving of approximately 85 per cent under hand-cutting costs.

*Brush-control specialist, E. I. du Pont de Nemours & Co., Inc.

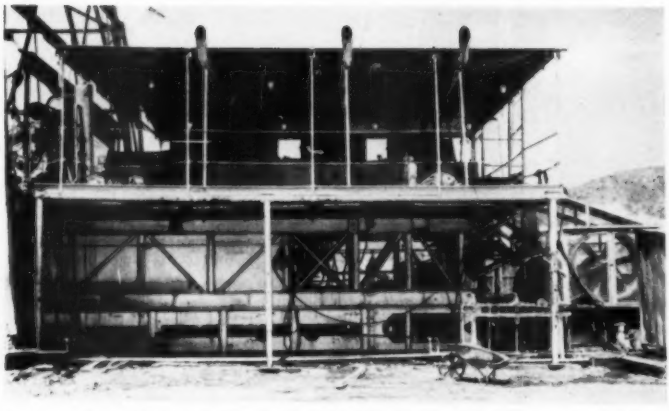

Fig. 1—Walk, studding, and canopy on rotary rig of Santa Fe Drilling Co., working at Ventura, Calif.

Catwalks Built as Permanent Panels Expedite Rigging Time

IN order to expedite rigging time, Santa Fe Drilling Co., currently operating in Ventura Avenue field of California, and which has 13 rigs running in various California areas, has developed a system of catwalks. These are for each side of the drilling engines, and are made in sections by using pipe and nonskid stair-tread stock.

The all-metal construction supplies a solid panel, not easily damaged by hauling, and being noninflammable contributes somewhat to the over-all safety of the drilling rig. The walks have an ample width for men to pass from one end to the other, and supply plenty of space for maintenance when repairs and servicing are necessary. By using a minimum number of supporting posts at the outer edges, the space below the walks is not congested with diagonal braces or other devices which can interfere with freedom of movement on either side of the power unit substructure.

Tailor made.—The walks are tailor made for the individual rig where they are to be used, and have frames made of pipe for outer sills and crossmember sleepers. These sleepers are spaced as closely to each other as necesary to support the flat steel floor so that the surface remains smooth even after heavy equipment has been unloaded upon it, and transmissions and material for repairs are moved from one end to the other. The outside sill supports a narrow steel toeplate about 6-in. high so that small tools and parts will not be shoved to the ground below.

Supports for the inside of the walks are made by utilizing the ends of the tow bars on the drilling-engine skid members. These bars extend on either side of the skid base the usual distance of about 8 in. and made in conventional manner, of pipe. These ends form excellent dowel pins for sleeves to fit, which are welded to the matching sleepers with short pieces of pipe. The sleeves are made of pipe which fit snugly over the ends of the tow bars so that inside supports are there for the using. When the walk section is lifted to its position beside the engines and the sleeves placed over the end pieces on the engine supports, tie bolts through matching holes in the walk section and in the derrick substructure top sills are inserted and drawn tightly with nuts to prevent end movement of the walk.

Outer sills.—The supports for the outer sills are made of pipe, with only three furnished for each walk section. Sleeves passing over the outer sills when the walk is constructed supply an anchor to which the supporting posts are welded. Each post is made in two parts. The upper section, which is just the right length to fold beneath the walk panel between and adjoining sleepers, and the lower piece. This is made of pipe the next size smaller to fit into the upper part and retained in the desired position when compensating for height by inserting pins through matching holes in both pieces of the support. The lower end of the bottom half has a large rectangular sheet of substantial steel welded in place as footing on hard ground, or to be placed on cribbing if the soil tends to waterlog or become soft under the weight of the equipment.

Ferrules or sockets are attached to the outer sills and welded thoroughly to the toeplate into which studding is inserted as supports for the canopy and the tail pipes for the drilling-engine mufflers. Safety rails, made of chain, are supplied for occasional tightening.

Since so few fittings are necessary when rigging up the walk sections, they are lifted as a unit with a truck boom or a motor crane, and by the time a section is leveled, it is secured to the substructure with the outer posts attached, and the walks are ready for use.

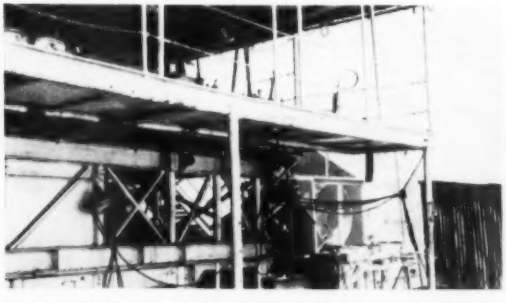

Fig. 2—Over-all view of sills, sleepers, and outer support on walk as fitted to rig.

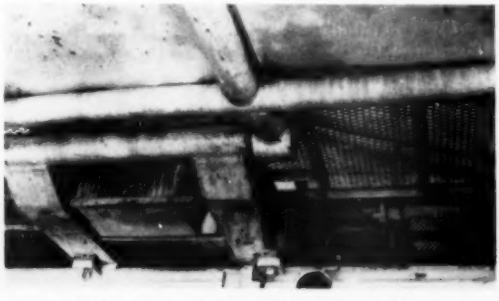

Fig. 3—Closeup photo showing inside connections between walk and tow-bar on drilling engine.

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High-Pressure Free-Liquid Knockouts

. . . for removing free water from well affluent

by Louis R. Records* and Dwight Seely, Jr.*

The utility of the knockout has been increased since the advent of the low-temperature separator, with the high-pressure knockout ahead of it

THE components in high-pressure gas reservoirs are usually considered to be entirely in a gaseous state. Due to the phenomenon of retrograde condensation, the hydrocarbons which are later produced as liquid are gases in the virgin reservoir. The characteristic saturation of these gases with water vapor is similar to any gas which is contained over the surface of a liquid water.

Fig. 1 illustrates a natural-gas reservoir over salt water which lies in the sand below the gas pocket. The natural gas is saturated with water vapor and it is the condensation of this water vapor that later shows up as liquid water at the surface. The amount of water vapor in the gas depends on the bottom-hole temperature and pressure. When these are known, the moisture content of the gas in pounds of water per million cubic feet of gas can be determined from Fig. 2. This water when produced is not salt water. It usually contains only 25 grains of salt per gallon of water compared to 2,500 grains of salt per gallon of salt water.

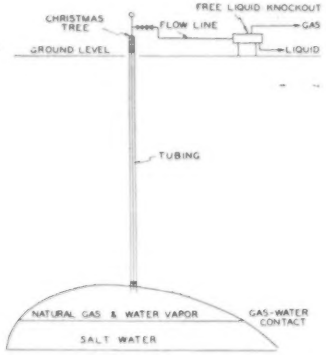

Fig. 1—Diagram of gas-distillate reservoir. Typical conditions: Bottom-hole pressure, 4,000 psi.; bottom-hole temperature, 180° F.; subsea depth, 8,600 ft.

Salt water, as such, is produced only when the well begins to "cone" due to heavy withdrawals or when the gas-water contact rises to the casing perforations as gas volume is depleted. The amount of free water produced, due to condensation of water vapor, does not usually exceed 1 bbl. per million cubic feet of gas while salt-water production can be virtually unlimited. The productive gas formation also contains connate water but as it is not usually produced, it will not need to be considered in this discussion.

Development of the free-water knockout was primarily for purposes of removing free water from the well effluent, ahead of the point of pressure reduction which is accompanied by a temperature reduction. The bulk of the water vapor, approximately 85 per cent, condenses by the time it reaches the surface. Since the freezing of lines is due to gas hydrates which are chemical compounds of natural gas and liquid water, the removal of the liquid water reduces the volume of one of the components necessary for the formation of hydrates. No hydrates can then be formed until changes in temperature and pressure of the gas cause further condensation of some portion of the remaining water vapor.

The recent advent of the low-temperature separator, with the high-pressure knockout ahead of it, has increased the utility of the knockout. In some cases it has been used to separate all free liquids, hydrocarbons, as well as water from the gas, and by suitable dump arrangements even separate the water from the distillate. The dump arrangements depend on the service expected from the knockout.

The free-liquid knockout must always be operated at temperatures above the hydrate-forming conditions.

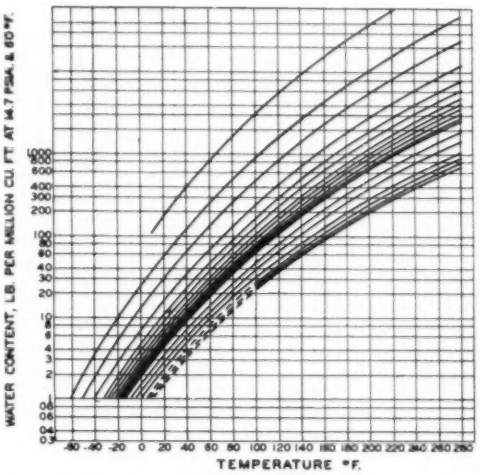

Fig. 2—Water-vapor content of natural gas at saturation. A correlation of various data by E. L. McCarthy, W. L. Boyd, and L. S. Reid.

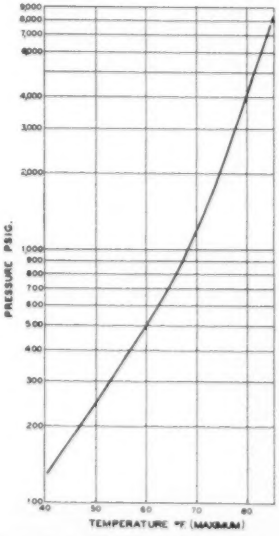

Fig. 3—Hydrate-forming conditions for natural gas.

*Sohio Petroleum Co., production department, Shreveport, La. Presented at Southern Gas Association annual convention, Biloxi, Miss.

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JOURNAL CHECK CHART

Need to meet gas "specs" for water content? Want to increase distillate recovery?

Are you missing a bet by not using these simple gas treating devices? Check each of these points with which you are familiar.

- ☐ 1. Most of the water vapor in the gas at bottom-hole conditions and substantial amounts of distillate have usually been condensed by the time the gas reaches the surface.
- ☐ 2. Expansion of the gas at the well head causes a lowering of temperature and further condensation of water and distillate.
- ☐ 3. After expansion, the free liquid knockout must be operated at temperatures above the hydrate forming conditions.
- ☐ 4. Sales gas with moisture well below the 7-lb. per M.M.c.f. maximum requirement may be recovered from this operation, and distillate recovery is increased appreciably.

These temperatures depend on the operating pressure and can be determined by Fig. 3.

A typical gas-distillate well can serve to illustrate the volumes of liquid that will be handled by a liquid knockout. This volume depends on the flowing bottom-hole conditions of temperature and pressure, the well-head flowing temperature and pressure, and the richness of the gas in barrels of distillate per million cubic feet of gas.

TABLE 1—WELL DATA PRODUCED WATER

Depth, ft.	Flow temp. (°F.)	Flow pressure (psi.)	Lb. water vapor per M.M.c.f.	Lb. water liquid per M.M.c.f.	Per cent water as liquid	Bbl. per M.M.c.f. liquid water
8,600	180	4,000	180	0	0	0
8,000	154	3,910	100	80	44.5	.23
7,000	139	3,770	82	98	54.5	.28
6,000	127	3,630	54	126	70.0	.36
5,000	118	3,500	48	132	73.4	.38
4,000	112	3,350	38	142	79.0	.41
3,000	106	3,220	34	146	81.2	.42
2,000	101	3,180	30	150	83.5	.43
1,000	95	2,950	27	153	85.0	.44
*0	90	2,800	24	156	86.8	.45

Anticipated pounds of water vapor in gas at separator conditions of 850 psi. and 35° F. is 4.5 per M.M.c.f. *Christmas tree.

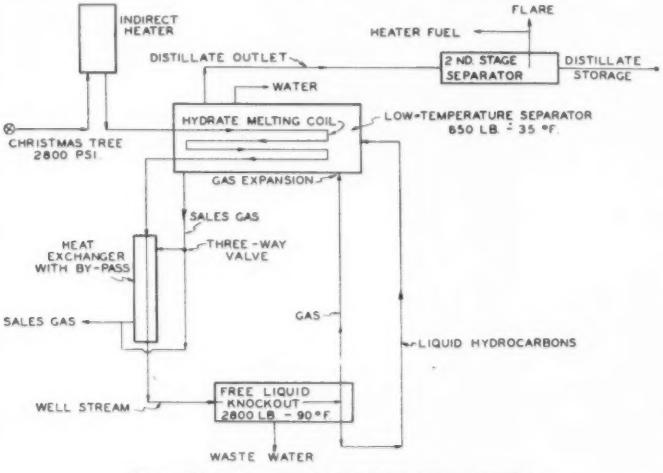


Fig. 4—Flow arrangement of low-temperature separator.

The determination of the volume of water that condenses in the tubing of the well at any point is a function of the flowing temperature and pressure gradient. The condensation of the water from a typical well is shown in Table 1. The shape of the curve with reference to percentage of water produced can also be used to predict corrosion points because the water condensation is necessary to form the acids that attack the tubing. Table 1 shows that 86.8 per cent of the total water vapor produced has condensed by the time it reaches the surface. It also shows that a total of only 0.45 bbl. of liquid water is produced by this well per million cubic feet of gas at the well head. It is this water that the knockout is to remove from the gas.

After the gas is reduced from the well-head temperature and pressure of 90° F. and 2,800 psi., where it contains 24 lb. of water vapor per M.M.c.f., to the low-temperature separator conditions of 850 psi. and 35° F.,

Fig. 5—Hydrate separator performance curves.

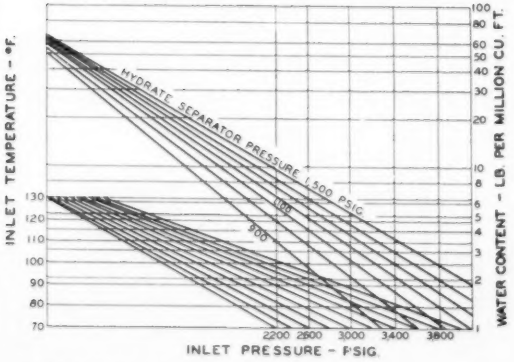
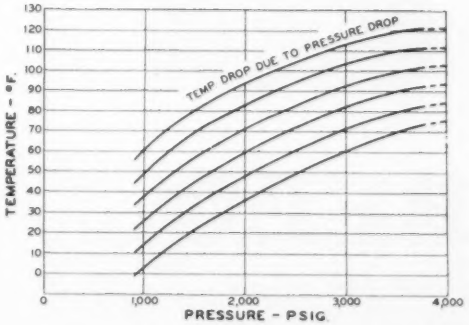


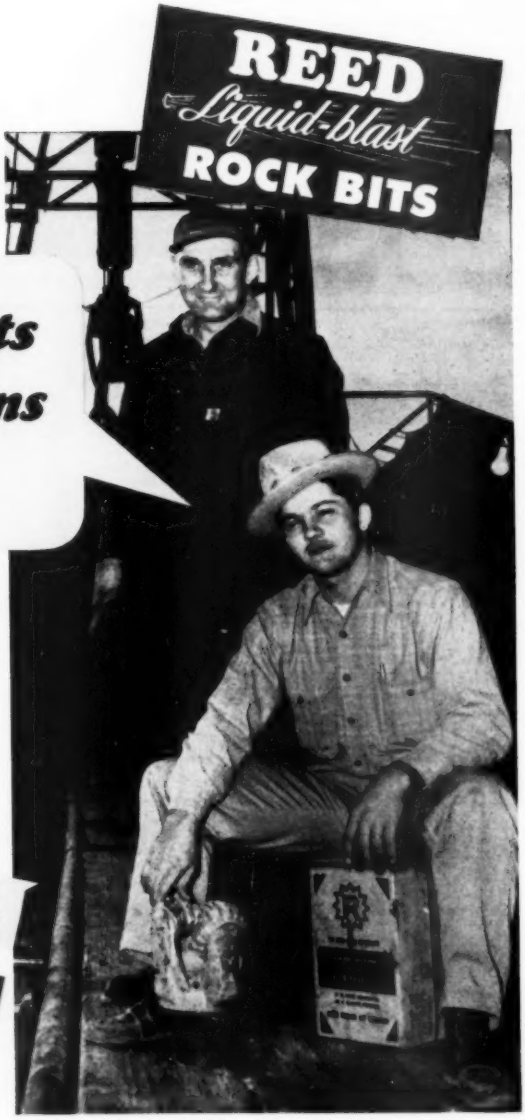
Fig. 6—Natural-gas expansion-temperature reduction curve, based on 0.64-sp. gr. gas.



George Ballow, tool pusher in Kansas for Nye Drilling Company, says . . .

REED *Rock Bits give good long runs in Kansas*

Mr. Ballow added, "We run into all kinds of formations here in Kansas, but I have found there is a **REED** Rock Bit that does a good job in every formation we encounter."



Bill Tobias, driller (standing) and George Ballow, tool pusher (seated) are shown with a **REED** TST-1 Rock Bit. This bit is noted for fast drilling of the softer Kansas formations.

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after expansion, the gas can only contain 4.5 lb. of water per M.M.c.f. The difference between 24 lb. and 4.5 lb. has been converted to hydrates in the low-temperature separator, then melted and the water, 19.5 lb. per M.M.c.f., dumped to waste.

Table 2 shows the volumes of hydrocarbons condensed at various points in the tubing. It shows that no hydrocarbon existed as a liquid in the reservoir but that 10.77 bbl. per M.M.c.f. has condensed at the surface at 2,800-psi. pressure and 90° F. and will be handled by the knockout. Further condensation will occur if the pressure and temperature are reduced.

TABLE 2 — WELL DATA, PRODUCED LIQUID HYDROCARBONS

Depth, ft.	Flow temp. (° F.)	Flow pressure (psi.)	Bbl. liquid hydrocarbons per M.M.c.f.
8,600	180	4,000	0
8,000	154	3,910	1.78
7,000	139	3,770	2.86
6,000	127	3,630	4.30
5,000	118	3,500	5.30
4,000	112	3,350	6.43
3,000	106	3,220	7.36
2,000	101	3,180	7.85
1,000	95	2,950	9.55
*0	90	2,800	10.77

Separator liquid recovery at separator conditions of 850 psi. and 90° F. is 18.6 bbl. per M.M.c.f. Stock-tank recovery is 14.85 bbl. per M.M.c.f. Low-temperature separator conditions of 850 psi. and 35° F. Anticipated stock-tank recovery—16.00 bbl. per M.M.c.f. (increase of 7.8 per cent). *Christmas tree.

A separator operating at 850 psi. and 90° F. on this well stream will show a liquid recovery under pressure of 18.6 bbl. per M.M.c.f. and after flashing to the stock tanks, the recovery will be 14.85 bbl. per M.M.c.f. The anticipated stock-tank recovery by low-temperature separator will be 16.00 bbl. per M.M.c.f. at 850 psi. and 35° F. The separator conditions of 850 psi. and 35° F. are predicted after the gas expansion from well-head conditions of 2,800 psi. and 90° F.

Fig. 4 illustrates a typical hookup of a low-temperature separator. The setting of this equipment depends almost entirely on flowing-well conditions and all of this equipment may not be needed on every installation. Generally the purpose of the equipment is as follows:

1. Indirect heater.—This unit is set to provide that adequate heat is present in the hydrate melting coils to melt all hydrates formed in the low-temperature separator.

2. Heat exchanger.—This item is set to take advantage of the cooling from the cold sales gas to control the temperature on the knockout. This temperature should be kept just above the hydrate expectancy point.

3. Free liquid knockout.—As shown, this equipment dumps the free water and allows the liquid distillate to leave the knockout separately from the gas. It can be made to dump the water and recombine the gas and distillate. Further, it can be used to dump the water and distillate from the knockout into the low temperature separator separately from the gas. The combination of the dumping arrangement depends on the manufacturer of the unit.

4. Low-temperature separator.—Expansion from well-head pressure into the low-temperature separator cools the gas. At these low temperatures, gas has a small capacity to hold either water or condensable hydrocarbons in a vapor state so these condense or form hydrates. The hydrates are melted by the hydrate melting coils. The gas goes to the heater exchanger and thence to sales. The water is dumped to waste and the distillate dumped into a second stage separator and thence to storage. The flash gas from the second stage separator is used as heater fuel.

The performance of the low-temperature hydrate separator as regards the dehydration of the gas can be determined by Fig. 5. The separator inlet pressure will usually be the same as the knockout pressure. The inlet temperature will be the knockout temperature. To read, start at bottom of chart with inlet pressure, follow diagonal line to inlet temperature line, thence upward to the separator pressure and then right to the water content.

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perature of gas after expansion under field conditions led to the construction of Fig. 6. It is used by starting with the initial pressure, following upward to the proper initial temperature, thence following the shape of the guide lines to the final pressure and reading across to the left for the final temperature.

The process of dehydration by low temperatures due to gas expansion depends upon high-pressure gas being available. Many units of this nature are operating and providing a sales gas with moisture content below the 7-lb. per M.M.c.f. maximum requirement, as well as increasing stock-tank recoveries. Other means of dehydration are necessary when high-pressure gas is not available.

Pan-Am Southern Accelerates Expansion

(Continued from page 101)

of recent improvements that reduce plant investment costs substantially. In addition, the design is expected to reduce operating and maintenance costs.

The alkylation unit also embodies recently developed features of simplification which reduce investment and operating costs.

The fluid hydroforming unit is a completely new development which extends the fluidized technique to the hydroforming process. This process, incorporating development features by Standard Oil Co. (Ind.), Standard Oil Development Co., and M. W. Kellogg Co., yields a product of higher octane number and higher volumetric yield than fixed-bed hydroforming, while at the same time permitting the use of a wider range of feed stocks, as the small amount of coke produced is constantly removed from the catalyst by regeneration. Yields when operating for aviation stock are shown in Table 3.

Utilities. — Multistage steam turbines will be used as drivers for the 3,100-hp. cat cracker blower, the 2,100-hp. cat cracker centrifugal gas compressor, and the 1,200-hp. alklyation unit centrifugal refrigeration compressor. Steam for the new units will be generated in three new gas-fired boilers rated at 70,000 lb. per hour each at 425 psig. and 750° F. total temperature.

Water for cooling and condensing will be provided from one new cooling tower designed to operate at 18,000 g.p.m. with a 30° F. cooling range and a 10° F. approach to an 80° F. wet bulb temperature.

Makeup water for the cooling tower, boilers, and other services will be clarified and treated river water. A river-water pumping unit with a capacity of 2,000 g.p.m. will be installed on a floating barge near the dock.

Construction schedule. — Contracts have been awarded for installation of all major units and facilities. The units are expected to be in operation by June 1, 1952, on a 14-month construction schedule.

The marketing territory of Pan-Am Southern Corp. comprises the five states of Arkansas, Alabama Louisiana, Mississippi, and Tennessee. A sixth, Kentucky, is now being entered. This territory is served with Pan-Am's products primarily from its El Dorado, Ark., and Destrehan, La., refineries.

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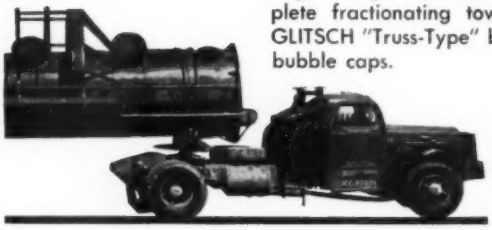

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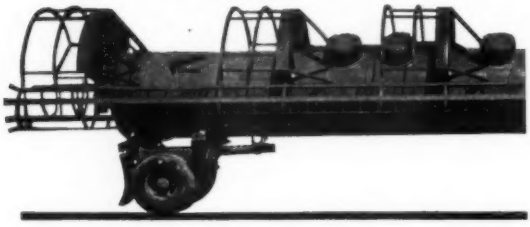

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BOOKS

THE TECTONICS OF MIDDLE NORTH AMERICA. By Philip B. King. Published by Princeton University Press, Princeton, N. J. 203 pp. $3.75.

This edition treats the tectonics, or architecture, of the rock formations of Middle North America east of the Cordilleran system, how these formations were created, and their modification by subsequent crustal unrest. Although the aim of the book is primarily descriptive, mention is made of various theoretical considerations relating to crustal deformation and the formation of mountain ranges, continental shelves, and other features. The book begins with the Central Stable region, consisting of the Laurentian Shield, or nucleus of the continent, and the surrounding lowlands. The author then extends his description to the mountain belts of Paleozoic age on the eastern side of the continent, and the bordering coastal plains. It is the author's intention to include in a second edition the mountain belts of Mesozoic and Cenozoic age on the western side of the continent. Each section includes an extensive bibliography of related material. The author is with the U. S. Geological Survey.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Sulfur Content of Petroleum Products

NOTE: Last week C. L. R. inquired about the sulfur content of distillates, diesel fuels, and kerosines throughout the United States. The question was of sufficient usefulness to warrant an extensive survey of the sulfur content of all types of products.

The sulfur content of a petroleum product is somewhat related to the sulfur content of the crude oil from which it was derived. Thus, if the crude oil contains a large amount of sulfur, it is obvious that the sulfur will appear in one or another of the products. Unfortunately, the sulfur in some crude oils is present mainly in the gasolines and distillates whereas in other crude oils it occurs in the higher-boiling or residual stocks. Coles Levee and Sunset fields of California contain low-boiling gasoline fractions that contain scarcely any sulfur even though these crude oils contain 0.5 and 0.88 per cent sulfur respectively. Venezuelan gasolines likewise contain relatively small amounts of sulfur. Complete sulfur-distribution diagrams have been published by the U. S. Bureau of Mines on crude oils from Coles Levee, Sunset, Slaughter and Yates fields.[2]

For these reasons, a correlation of the sulfur content of products as related to the sulfur content of crude oils can only be an approximation. In last week's issue, Fig. 1 showed approximate sulfur content of gasoline, kerosines, gas oils, and residues as a function of the percentage of the sulfur in the crude oils from which they were produced. The chart was based on data in the 24 references tabulated at the end of this discussion, and it represents the average behavior of more than 135 crude oils. However, examination of Figs. 1 and 2 shown here, indicates clearly that the accuracy of such correlations is not good. Thus, Figs. 1 and 2 and Fig. 1 from this page in last week's issue, may be used for average conditions but they cannot be applied with accuracy to a specific crude oil and its products.

Note that the distillate products from California, West Texas, and Panhandle fields are usually relatively high in sulfur, and that the residues from these same crude oils must be somewhat lower in sulfur content than residues from other crude oils of the same sulfur content.

The sulfur content of the crude oils produced in various districts has been determined by the U. S. Bureau of Mines,[26] and Table 1 in last week's issue are their data for the year 1947. With this table and the several figures shown here and last week, it is possible to approximate the average sulfur content of products being marketed throughout the United States. The sulfur content of gasolines and residual fuel oil (and to some extent distillate fuels) will, of course, be altered by the cracking operations by which they are produced.

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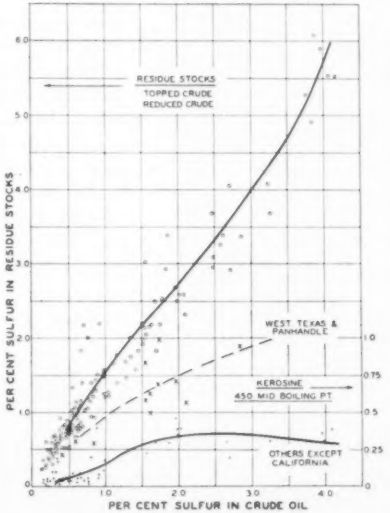

Fig. 1—Sulfur contents of kerosine and residue stocks as a function of sulfur content of parent crude oils.

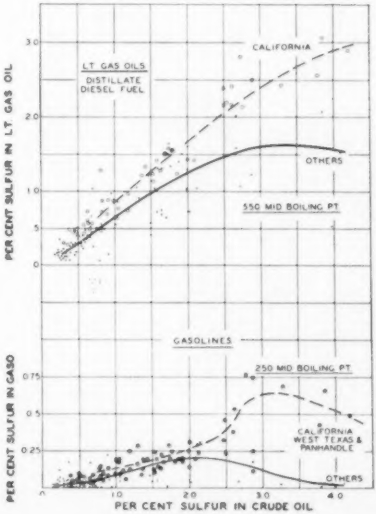

Fig. 2—Sulfur contents of light gas oils and gasolines as a function of the sulfur in crude oil.

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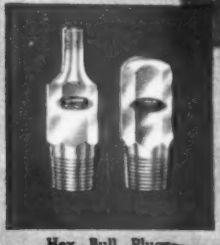

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ENGINEERING fundamentals

No. 459

Dependence of Flooding on Relative Permeability

IT has been stated that the progress of a linear flood depends on the ratio of oil and water viscosities. The dependence is such that the amount of oil recovery at the time of water breakthrough decreases as the oil-to-water viscosity ratio increases. It is of interest to inquire further how this relationship varies with the type of relative permeability curves for the porous medium being flooded.

The per cent oil recovery (in per cent of pore space) is given by:

$$\text{Per cent oil recovery} = \frac{100\,S_{wx}}{(f_w)_{S_{wx}}} \quad (1)$$

where S_{wx} is the water saturation at the flood front and $(f_w)_{S_{wx}}$ is the fraction of water flowing at the flood-front conditions. This equation is further based on the assumption that original connate water is zero, and therefore per cent oil recovery is also equal to per cent water saturation at breakthrough. (See Engineering Fundamentals No. 457 for development.)

The flood-front saturation is given by the following condition (also assuming no connate water):

$$(f_w)_{S_{wx}} = S_{wx}\,(df_w/dS_w)_{S_{wx}} \quad (2)$$

By differentiating the expression for f_w with respect to water saturation and combining with Equation 2 the effect of both relative permeability and viscosity ratio can be elucidated. Thus:

$$f_w = \frac{1}{1 + (k_o/k_w)\,(\mu_w/\mu_o)} \quad (3)$$

and

$$df_w/dS_w = -(f_w)^2\,(\mu_w/\mu_o)\,d\,(k_o/k_w)/dS_w \quad (4)$$

Substituting these last two equations in Equation 2 and simplifying, yields the following condition for water saturation at the flood front:

$$\mu_o/\mu_w + (k_o/k_w)_{S_{wx}} = S_{wx}\,[d\,(k_o/k_w)/dS_w]_{S_{wx}} \quad (5)$$

After S_{wx} is found from Equation 5, f_w can be calculated and Equation 1 used to find per cent water saturation at breakthrough.

Four separate relative permeability curves are herein examined by Equations 5 and 1 to give the effect of viscosity ratio on breakthrough conditions. Fig. 1 shows the curves used. These are experimentally measured curves on actual cores.[1] Fig. 2 shows plots of k_w/k versus S_w for each core. Fig. 3 shows k_o/k_w and the product $S_w\,(df_w/dS_w)$ plotted against water saturation for core "A." On Fig. 3 lines have been drawn to show that for μ_o/μ_w equal to 3, Equation 5 is satisfied at a water saturation of 0.585. At this saturation k_o/k_w is 0.22 and f_w is 0.93. The water saturation at breakthrough is, therefore, $100 \times 0.585/0.93 = 62.9$ per cent.

In Fig. 4 the complete results of such calculations for μ_o/μ_w values up to 10.0 are plotted for the four porous media, using the relative permeability ratios of Fig. 2. Although the variations in saturation at flood breakthrough due to change in oil viscosity are similar, the quantitative effects depend upon the relative permeabilities. It is necessary, however, to examine the ratios as given by Fig. 2 rather than the absolute relative permeabilities as given by Fig. 1 in order to anticipate the magnitude of the change due to viscosity.

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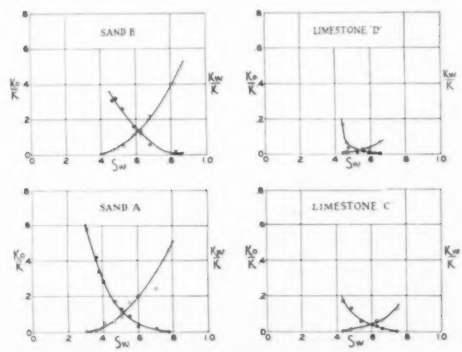

Fig. 1.

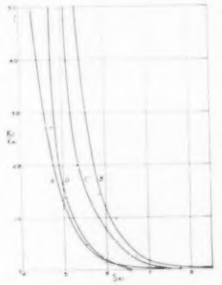

Fig. 2.

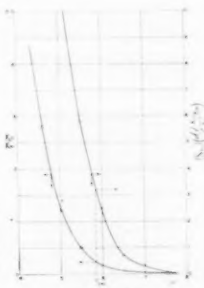

Fig. 3.

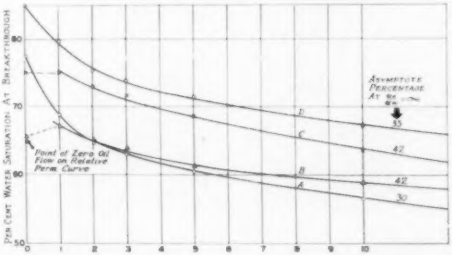

Fig. 4—Calculated effect of viscosity ratio on water saturation at breakthrough, using Equations 5 and 1.

Series by John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

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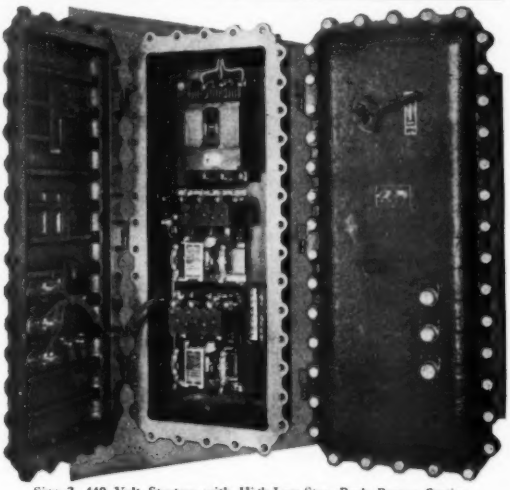

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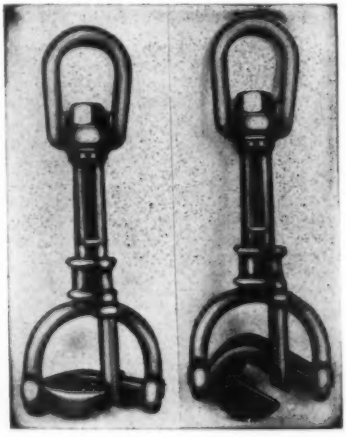

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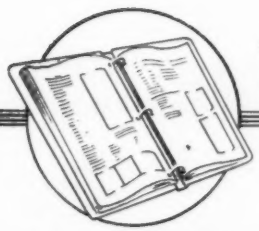

THE REFINER'S notebook

No. 88

Refractory Materials

PROPERTIES OF REFRACTORY MATERIALS

...perties refer to pure materials except those marked with asterisk (*) which were obtained from commercial products. Data for a commercial refractory may ...ffer from those of the pure material because of impurities, bonding materials, and process of manufacture. The specific heat, thermal expansion and conductivity data, however, may be used for engineering purposes.

Material	Formula for pure material	Melting point	True specific gravity	Hardness (Mohs's scale)	Mean specific heat (A)	Thermal expansion (B)	Thermal conductivity (C)			Electrical resistivity in ohms cm² (D)		
							1000°F	1600°F	2400°F	1500°F	2000°F	2500°F
Alumina (Corundum)	Al_2O_3	2015°C 3660°F	4.0 (1)	9	0.270 (30-1300°C)	8.1 (30-1250°C)	22.0* (2)	18.0* (2)	10.3* (2)	140,000* (3)	24,000† (3)	170* (3)
Beryllia (Beryllium oxide)	BeO	2510°C† 4550°F (4)	3.03	9	0.39	9.3 (25-1400°C)			104.0 (2190°F)	4×10^{14}	3.5×10^{13}	2×10^{12}
Carbon, blast furnace grade	C (5)	(6)	2.10	4 to 6	0.25*	4.0*	37*	34*	19*	0.00305*	0.00305*	
Chromite	$FeO.Cr_2O_3$ (7)	2180°C 3956°F	4.5	5.5	0.22*	8.0*	12.6*	12.7*	13.2*	650*	185*	40*
Diaspore (8) (Diasporite)	$Al_2O_3.H_2O$	2015°C 3660°F	3.4	6.5 to 7	0.25†	6.5*	11.6* (9)	10.9* (9)	10.0* (9)	10,500*	1,650*	350*
Dolomite	White calcined CaO.MgO	Above 2570°C 4660°F	2.83-2.99	4.0	0.222 (20-100°C)	14.0		15.0* (1500°F)				
Fireclay refractories*	(10)	(11)	2.6-2.7	(12)	0.259 Range 0.252-0.266	1.0x10⁻⁶ (25-200°C) 5.1x10⁻⁶ (200-1000°C) (13)	7.7 (14)	9.1 (14)	10.9 (14)	23,500†	4,200†	1,000†
Forsterite	$2MgO.SiO_2$	1890°C† 3434°F	3.19	6 to 7	0.22 (20-100°C)	10.5*	11.3*	10.6*	9.7*			
Graphite	C	(15)	2.25	1 to 2	0.34*	1.5*	700*	600*	500*	0.00076*	0.00079*	0.00084*
Magnesia (16) (Periclase)	MgO	2800°C 5072°F (17)	3.6	6.0	0.287 (30-1300°C)	14.3 (20-1400°C)	37.6*	22.9*	20.0*	6×10^{14}*	3.6×10^{13}*	10,500*
Magnesia spinel	$MgO.Al_2O_3$	2135°C† 3875°F	3.6	8	0.257	9.0 (20-1250°C)	12.3*	13.3*	14.5*	Very high	High	
Mullite	$3Al_2O_3.2SiO_2$	1830°C 3326°F (18)	3.16	7.5†	0.238	5.3 (19)	16.6 (20)	14.2 (20)	13.2 (2000°F) (20)	90,000* (21)	11,200* (21)	Under 1,000* (21)
Quartzite (22) (Quartz)	SiO_2	1715°C 3119°F (23)	2.65	7	0.253	40* (24) 6* (25)	9.6* (26)	11.6* (26)	14.4* (26)	240,000* (26)	[illegible]*	9,200* (26)
Silica Vitreous	SiO_2	1710°C† 3110°F (27)	2.2	7	0.134 (20-1200°C)	0.54*			13.3* (2370°F)	2×10^{14}* (1000°F)	2.2×10^{13}* (1400°F)	
Silicon carbide	SiC	2200°C† 3990°F (28)	3.17 to 3.21	9.5	0.19 (29)	5.2* (30)	45.5* (30)	46.6* (30)	48.5* (30)	11,000* (30)	6,500* (30)	1,500* (30)
Sillimanite minerals (31)	$Al_2O_3.SiO_2$	1816°C 3300°F	3.24	6 to 7.5	0.17	3.4*	10.6*	11.0*		140,000*	21,000*	4,500*
Thoria	ThO_2	3050°C† 5522°F	9.69	6.5†	0.06	9.4 (20-1400°C)				6.1×10^{12}	5×10^{11}	6.5×10^{9}
Zircon (Zirconium silicate)	$ZrO_2.SiO_2$	2500°C 4532°F (17)	4.7	7.5	0.132 (31-51°C)	5.1 (30-1250°C)	19.9*	16.3*	14.2* (2000°F)	High up to dissociation temperature		
Zirconia (Zirconium oxide)	ZrO_2	2700°C 4892°F	5.5 to 6.1	8.5	0.188	11.0* (20-1350°C) (32)	5.0* (32)	5.0* (32)	5.0* (32)	High below 1470°F		

† Approximate.

A. For the range 20 to 1,000° C. (68 to 1,832° F.) unless noted.

B. Mean reversible thermal expansion per °C. times 10^{-6}, for the range 20 to 1,000° C. unless noted.

C. Thermal conductivity in B.t.u./sq. ft./hr./° F./inch thickness, from the more reliable data or an average.

D. Available data show wide variation for a given material resulting from lack of a standardized method of testing along with the influence of chemical composition and physical properties.

1. Alpha corundum.
2. 99% alumina product.
3. Brick with alumina content of 85%.
4. Volatile above 1,650° C. in presence of water vapor and is toxic.
5. Blast furnace grade 90% carbon.
6. Oxidizes but in reducing atmosphere gradually converts to graphite above 2,200° C.
7. General chemical formula for chromite is $RO.R_2O_3$. The RO oxide is usually FeO and may be replaced in part by MgO, while the R_2O_3 is mostly Cr_2O_3 but may be replaced in part by Al_2O_3 and Fe_2O_3.
8. Commercial diaspore is composed of diasporite grains bonded with clay.
9. Diaspore brick 75% alumina, porosity 30%.
10. Silicates of aluminum having a wide range in composition depending upon type of product; silica range 50 to 75%, alumina 20 to 45%. The ratio of silica to alumina and fluxing constitutes present are principal features.
11. Expressed as Pyrometric Cone Equivalent (P.C.E.), A.S.T.M. requirement for minimum P.C.E.; Low duty cone 19 (2,770° F.); high duty cone 31-32 (3,030° F.); super duty cone 33 (3,175° F.). Refractoriness is also measured by amount of subsidence in the hot load test.
12. Varies, depending upon type; abrasion resistance better measure but no standard test developed.
13. Mean value. Range to cover various types; at 200° C. ± 4.5 × 10^{-6}, and at 1,000° C. ± 9 × 10^{-7}.
14. Approximate range of data ± 1.5 B.t.u. resulting from methods used and property of materials.
15. Oxidizes but in reducing atmosphere sublimes above 3,700° C.
16. Magnesia is amorphous, or crystalline (periclase), depending upon heat treatment.
17. Dissociates at very high temperatures.
18. Melts incongruently, forming corundum and siliceous liquid.
19. Synthetic, pure.
20. From a virtually pore-free body.
21. Clay-bonded (alumina 67%).
22. Called ganister (about 98% silica) in the trade and is used for manufacture of silica brick.
23. Quartz inverts to tridymite 870° C. and tridymite to cristobalite 1,470° C., the melting point is for the latter form.
24. Silica brick in temperature range 30 to 230° C.
25. Silica brick in temperature range 230 to 1,000° C.
26. Silica refractories.
27. Softens about 1,150° C.
28. Decomposition temperature, oxidation may start at 900° C.
29. Varies considerably with temperature.
30. Clay-bonded 90% silicon carbide.
31. Andalusite and kyanite are of the same chemical composition and all change to mullite plus silica upon heating.
32. "Stabilized" product.

CAN YOUR ROTARY HOSE BE REPAIRED?

GOODALL LONG-LIFE ROTARY HOSE...

with the Built-in Barney Coupling

Gives You

DOUBLE SERVICE LIFE

Times like these especially . . . with steel and rubber on the critical list . . . test the maximum life of all types of equipment.

In the case of rotary hose, however, Goodall Rotary Hose owners have positive assurance that they will receive maximum life at all times . . . because Goodall is the only manufacturer that protects rotary hose investments with a time-proved maintenance policy. Goodall can offer this money-and-equipment saving policy because only Goodall Rotary Hose has the Barney Coupling, the first and only rotary hose coupling that can be reset to save your hose from the scrap heap.

That's why we say to all Goodall Rotary Hose owners: ***Never Discard a Goodall Rotary Hose until you contact us.*** And that's why we want to suggest to all rotary hose users: ***Why buy any other rotary hose that does not give you this Goodall combination of extra long life with extra protection for your investment?*** Thanks. Barney.

COUPLING—The original Barney Coupling is the only coupling that is stronger than the hose itself. It is the only coupling that can be reset to save your hose from the scrap heap.

CORD CONSTRUCTION—Goodall's flexible cord design provides the extra strength to withstand torsional twist . . . thus eliminating the cause of more than 90% of rotary hose failures.

FLEXIBILITY—Goodall Long-Life can be coiled into a convenient unit for transporting without slightest damage.

PERFECT BALANCE—The Goodall method of winding the multiple cords of the carcass and the steel cables of the pressure element at corresponding angles assures perfect balance.

GREATER STRENGTH—By actual test, Goodall Long-Life is the strongest hose ever built and it retains its strength better than any other hose.

REPAIR SERVICE—Goodall Rubber Company is the only rotary hose manufacturer that can protect your investment with a maintenance plan. Goodall maintenance provides a repair department in Houston where any length of Long-Life that meets with an accident can be renewed for the rest of its normal life. No length of Long-Life repaired in our shop has ever failed in service.

SALVAGE VALUE—Substantial allowances are made on every set of Barney couplings returned.

NO PREMIUM PRICE—The extra quality, longlife and high salvage value of Goodall Flexible Cord costs no more than ordinary rotary hose.

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TRENTON, N. J.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 KEEP 'EM ROLLING, a two-color, four-page brochure describes a tested cooling-system filter and coolant conditioner, for use on highway and stationary engines. Capacities are up to 30 gal. *Spark-O-Liner Corp.*

2 YOU CAN DEPEND ON BELL SWABS is an eight-page folder devoted to detailed descriptions of tubing swabs, drill-pipe swabs, ball-bearing sinker-bar connections, and overload relief valves for tubing swabs. *Bell Rubber Co.*

3 HYDROGEN ZEOLITE CATION EXCHANGE SOFTENERS is a technical evaluation of hydrogen zeolite cation exchange process as compared to the sodium zeolite cation exchange process. Particular emphasis is placed on softening in this 16-page booklet. *Cochrane Corp.*

4 FAST'S SELF ALIGNING COUPLING gives detailed descriptions, engineering drawings, capacity tables, and photographs on the gear-type coupling. *Koppers Co., Inc.*

5 CONDENSER AND HEAT EXCHANGER TUBES discusses corrosion problems and the selection of the proper alloy for condenser and heat-exchanger service. *Chase Brass & Copper Co.*

6 EXPAND-R-STRAP. The application of steel strapping that stretches and snaps back with expanding and contracting surfaces is illustrated in this two-color brochure. This corrugated, tempered, stainless-steel strap may be used for securing insulation around tanks, towers, pipe, and other equipment that contracts and expands in circumference. *A. J. Gerrard & Co.*

7 CONTROLLED VOLUME PUMPS. An illustrated, 24-page, 2-color bulletin gives complete details on controlled volume pumping, describes performance features, and includes data required for specific applications. Four pages of color charts show the relative corrosion resistance of materials of construction to over 170 chemicals. *Milton Roy Co.*

8 STOCK ROLLER CHAINS AND SPROCKETS. Catalog C 55-50 gives details on list prices, available sizes of types A, B, and C stock sprockets, and pertinent information on stock roller chain from ⅜ to 2-in. pitch. Data are also included on drive selection, service factors, installation, and service. *Morse Chain Co.*

9 RATOMATIC FLOW RATIO CONTROLLERS is a new catalog describing the features of automatic-flow ratio-control systems. The principle of operation is given as well as the fundamental reasons for improved ratio control. A list of typical applications is included. *Fischer & Porter Co.*

10 PANACRETE - PANASEAL INSTA-SEAL is described in a brochure showing 11 pages of graphs and water tables on comprehensive strengths, and bridging actions. *E. F. Snyder.*

11 TANK-VENTING EQUIPMENT Bulletin CP-2001 illustrates and describes an extensive series of tank

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Sept. 13, 1951

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equipment, gas control, and safety devices for the safe handling and conservation of combustible or toxic liquids and gases in the petroleum, chemical, and other industries. *The Vapor Recovery Systems Co.*

12 SCRAPED SURFACE EXCHANGERS. New eight-page bulletin describes and illustrates the double-pipe-type and the shell-and-pipe-type scraped surface exchangers used as oil chillers, crystallizers, and heaters. Detailed construction data are also included. *Henry Vogt Machine Co.*

13 TEMPERATURE AND PRESSURE REGULATORS used in hot-water service tanks, oil preheaters in power plants, and oil treaters, are described and illustrated in a new 15-page bulletin. Valve-size selection tables, dimensions, and price lists are shown. *Manning, Maxwell & Moore, Inc.*

14 PIPE-LINE PROTECTION PRODUCTS. An interesting, informative and profusely illustrated booklet describes techniques and materials recommended for protective coating of pipe lines, including information on asbestos pipe-line felt, glasfloss pipe wrap, and pipe-line padding. *The Philip Carey Manufacturing Co.*

15 CORROSION-RESISTANCE OF COPPER AND COPPER ALLOYS, a 24-page booklet, explains the chemical and physical nature of corrosive attack in its various forms on copper and copper alloys. Included is a tabulation indicating the relative corrosion resistance of the principal types of copper and copper base alloys when in contact with 193 different corroding agents. *The American Brass Co.*

16 SERVICE AND MAINTENANCE TOOLS. Catalog TR contains 104 pages of all types of socket-wrench equipment, hand tools and wrenches, punches, and chisels, and features large illustrations of all types of wrenches with copy keyed to them for easy identification. Complete specifications are given. *Snap-on Tools Corporation.*

17 ELECTRICAL MEASURING INSTRUMENT booklet covers seven basic selection factors, types of instruments available in each major classification, and four typical selection problems are solved to help reader selection. Descriptions of instrument auxiliaries are included. *Westinghouse Electric Corporation.*

18 MOTOR STARTERS. New eight-page folder illustrates and describes a new line of "Explo-Safe" and weatherproof motor starters for hazardous locations. It also includes dimensions, weights, ratings, and wiring diagrams. *Industrial Control Division, The Arrow-Hart & Hegeman Electric Co.*

19 STEAM-TRAP SELECTOR is a 19-page supplemental bulletin listing common process and industrial equipment. Trap-selection tables are given for each type showing trap capacities relative to the equipment and normal operating conditions. *Yarnall-Waring Co.*

20 DUCK AND RUBBER PACKINGS in various types including low-pressure, crossexpansion, and hydraulic, are all described in an eight-page bulletin, which also gives service recommendations for each type packing, lists available standard sizes, and gives complete packaging specifications. *Raybestos-Manhattan, Inc.*

21 DEHUMIDIFIERS. Bulletin DD-130 describes dynamic dehumidifiers for instrument air, for either fully automatic or semiautomatic operation. Each unit is equipped for electric regeneration. Included is a diagram showing operation of the dehumidifiers, tables giving equipment on the two models, as well as other operating data and prices. *Industrol Corp.*

22 MANIFOLD DISCHARGE PIPING APPLICATION Manual 51-B gives operating test data on a line of FarriSeal and BalanSeal bellows-type safety-relief valves, as well as data of general interest to the engineer, draftsman, or designer of closed safety-relief discharge systems. *Farris Engineering Corp.*

23 STEAM TRAPS. Thermostatic-type industrial, radiator, and expansion steam traps, as well as weight and piston-operated traps, are illustrated and described in a 29-page catalog. Price lists and capacity tables are shown, together with operation and application data. *W. H. Nicholson & Co.*

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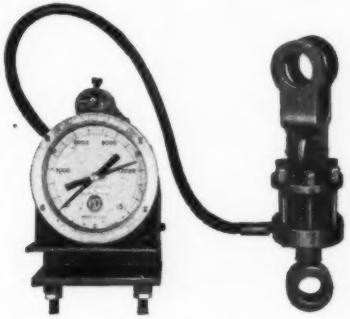
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

24 TONG TORQUE INSTRUMENT removes the two basic causes of drill-pipe failure: overtonging, which results in pulled and distorted threads, and running



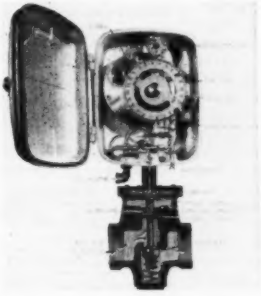
collars too loose, which allows the joints to work, resulting in cracks and washouts. This instrument, which has been developed for measuring torque when making up and breaking out drill-collar joints, is also useful for torque measurements on pipe and casing joints. A maximum pull can be established and held, regardless of the various operating variables. A clevis has been designed to fit the tong handle so that the cylinder can be attached or removed simply and easily without any alteration to the lever. The regular cable, rope, or chain can be connected to the other end of the cylinder. A maximum cable pull of 15,000 lb. has been provided on the direct-reading dial gage. This would be 60,000 ft.-lb. torque when using a 4-ft. lever. A separate pointer has been included for either indicating maximum pull for the joint or for manually setting to the maximum pull to be used by the crew. *Martin-Decker Corp.*

IT'S NEW CHECK IT

25 MAGNUSOL, an emulsion solvent cleaner, has been found to shorten the time required to soften paraffin in tubing by a large margin. In practice, 10 gal. of Magnusol concentrate are mixed with 60 gal. of kerosine and the resulting solution is then poured down the tube. After 45 minutes, the paraffin is softened enough for the scrapers to go to work. With Magnusol in the kerosine, there is no trouble with crudes containing water and the sticky, packed paraffin deposits usually associated with this type of crude oil. *Magnus Chemical Co., Inc.*

IT'S NEW CHECK IT

26 PNEUMATIC CONTROLLER is a clock-driven mechanism in combination with a pneumatically operated valve. The proration dial is an exclusive feature. A pin or pins inserted in holes for each day of the week will shut in a well for one or any combination of days. A large selection of time dial and clock combinations offers the widest possible choice of time-cycle operations. From a 1-hour dial and clock combination to a 24-hour combination, a range of from 1 to 192 operations per day is possible. A nonbleed, three-way, snap-action pilot saves gas and eliminates control gas regulator freezing problems. Entire unit weighs 28 lb. The control element can be used on other valves such as diaphragm-operated types. Valve is quick opening and motion is downward, sealing cylinder walls from all line fluid. *John A. Sharp Co.*



IT'S NEW CHECK IT

27 AMETRON ELECTRONIC SCALE. By the use of electronic cells this new scale will record and print on ticket, tape, or even a ledger, remote from the scale, the exact weight. The load on the electronic scale is measured by Baldwin-Lima-Hamilton precision load cells. The signal from the load cells, which is proportional to the weight on the scale, is amplified and actuates an error-sensitive mechanism. The indicating instrument is a full figure step cam-controlled recorder. It includes provision for multiple ranges to give increased capacity

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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Stuffingboxless Pumps

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Bingham Stuffingboxless Pumps are especially adapted for and are giving exceptional service in many types of industry such as *Oil Refineries, Synthetic Rubber and Plastics industries, Natural Gasoline plants, Pipeline Booster stations, Terminal and Storage Tank Farms, Chemical plants, Food Processing industries, heavy construction and industrial applications.*

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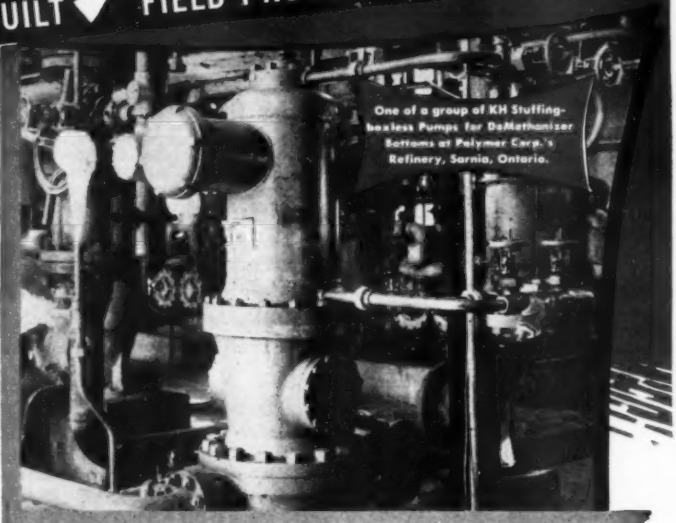

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Section of Inspection Department in our new modern plant.

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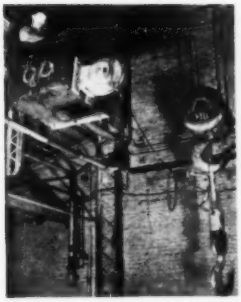
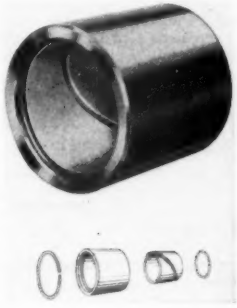


with high sensitivity and accuracy. Both the load cells and instruments are designed to operate over wide ranges of temperature. The weighing system may be designed to operate with any number of load cells. Ticket, card, and ledger-sheet printers are available to meet various requirements. Dials, special printers, and other accessories are available. Readings can be made at any number of points. *Streeter-Amet Co.*

IT'S NEW CHECK IT

28 NYLINED BEARING consists of an outer sleeve of inexpensive metal and a relatively thin lining of Nylon bearing material. Nylon liner is retained in outer sleeve in a manner which will permit it to expand and contract circumferentially around the inner periphery of the outer sleeve. The liner is provided with compensation gap, which interrupts the circumference. In applications where lubricants can be used, one or more annular grooves are provided on the inside of the outer sleeve to form storage wells for grease or other lubricants which are evenly distributed through the compensation gap. Closer fits possible due to the Nylined principle afford uniform load distribution over the working surface, assuring greater load capacity and life. *Thompson Industries, Inc.*



IT'S NEW CHECK IT

29 MIDWEST HEATING KETTLE. This kettle features a hydraulically operated, sweep-type, telescoping agitator with shaft mounted on roller bearings. It is powered by a Wisconsin AEN 6-hp. engine. The unit is also available with a single-cylinder diesel engine, making it possible to use only one fuel for complete dope-pot operation. The kettle's ceramic refractory bottom will not burn out. It is heated with a single Hauck burner and Root-Connersville blower with a builtin fuel pump. Independent clutches are provided for blower and hydraulic pump so that they may be run separately. Necessary gages are standard equipment. Weight of the skid-mounted kettle is 4,950 lb. It is also available on Athey tracks. *Midwest Pipeline Service.*

IT'S NEW CHECK IT

30 NEW WEATHERPROOF NUT. A newer, longer, and completely weatherproof nut has been added to the Alten Wonbolt polished-rod clamp. This new nut not only keeps out ice, mud, and snow, but gives added wrenching surface. Alten is prepared to furnish this clamp, which is completely self-aligning and has only one nut to fasten, in two sizes both with the new weatherproof nut. *Altens Foundry & Machine Works, Inc.*

IT'S NEW CHECK IT

31 GRAYCOTE PLASTIC SEALER, a new compound for sealing gaskets and threaded joints of all types, is composed of six basic ingredients, chief of which is a spongy metallic pigment locked in an insoluble vehicle. Retention in the non-drying vehicle keeps the compound soft, creating a permanent seal but allowing units to be easily disassembled after long periods of time even under high-temperature conditions. Graycote is recommended for all oil, water, steam, gaseous fuel, and refrigerant applications. It is ideal for sealing gasoline, distillates, L.P. gases, and jet-engine fuels. It may be widely used as a general-purpose sealing and antiseize compound on mechanical equipment and in hydraulic units handling pressures up to 5,000 psi. *Chicago Gasket Co.*

IT'S NEW CHECK IT

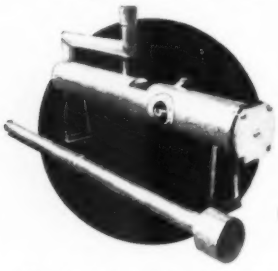
32 UNEEPAC is a molded packing and each ring is a complete, self-contained packing unit. It is particularly valuable in the design of new equipment. It is designed for maximum sealing efficiency in minimum packing depth so stuffing-box sizes can be reduced. This saves space and cuts machining costs. No follower or header rings are needed. Each ring centers itself perfectly on the preceding ring. In service, each lip is always exposed to fluid pressure, providing instantly responsive sealing. Since it does not depend on gland pressure for sealing, friction is reduced and there is less wear on both rod and packing. Uneepac is offered in varied compositions to suit different services: water, steam, oil, air, gas, or vacuum. It is furnished in sets of endless or split rings. It is available for shafts of $\frac{5}{8}$-in. diameter and up. *Johns-Manville.*

IT'S NEW CHECK IT

OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

33 LILLY SAFETY HEATER specially designed for use in dog and tool houses is completely explosion-proof and features a builtin flame arrester that positively prevents flashback. Wild gas entering the heater must burn inside the combustion chamber or choke the flame out. Self-regulating, the heater will smother itself out above a predetermined temperature considered safe by the designers. At maximum temperature, surface heat will not ignite combustible fluids including gasoline. A gastight plug removes for lighting. The heater is tested in the presence of wild gas before delivery. A builtin coffee-warmer grill is included. *Miller-Nelson Machine Works.*



IT'S NEW CHECK IT

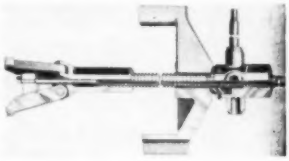
34 FIREYE SYSTEM FP-2 consists of programing control type 26RJ8 and Firetron scanner type 48PT1. The scanner is compact in design and utilizes a photoconductive cell which responds to all flames. It checks the pilot flame and the establishment of the main flame, whether gas, oil, or a combination of both. Its response to flame failure is positive and instantaneous. Programing control provides for preliminary purge of the combustion chamber, ignition, fuel valve delay, post-ignition timing, and post-purge. Terminal connections are available for directly handling flame failure alarm and modulating motor. Response to flame failure results in complete fuel cutoff in 2 to 4 seconds. Fail-safe circuits cause instantaneous shutdown of the burner upon failure of any component and prevents a startup under any unsafe condition within the entire burner system. *Combustion Control Corp.*

IT'S NEW CHECK IT

35 KINGSEAL, an additive to prevent and eliminate lost circulation in rotary oil-well drilling, is a highly engineered product basically consisting of wool, cotton, jute, synthetic fibers (such as rayon and nylon), wood fiber, and/or sawdust of a varied and determined particle size. The sawdust starts a plugging action at the point where the clay particle has lost its efficiency. The fibers interlace and adhere to every shape of the formation whether it be crevice, fissure, crack, or the interstices in a large grain or gravel bed. The sawdust, meanwhile, fills in these interlaced accumulations of fibers until a sheath or plug has been formed into almost a cementatious condition. The strength of this accumulation is such that the more pressure put against it the greater its adherence. The result is a tailored plug to fit each interstice, crack, or crevice. The running in and out of the bit or core barrel cannot interfere with the innersealing since no important "scab" exists at the lost circulation point. Kingseal does not change the chemical value of any mud nor does it sour or deteriorate, regardless of time. *William E. Sievers Corp.*

IT'S NEW CHECK IT

36 GRANT LINER PULLERS are designed to remove liners from slush, feed-water, or any other pumps equipped with removable liners. Exclusive of the yoke the few parts of which each puller is comprised are permanently integrated into a rugged, serviceable unit. There is no need for a multiplicity of heads. One yoke covers the entire range of sizes for each puller, and the yoke features an open slot which makes it unnecessary to run the nut the full length of the screw each time a liner is pulled. The nut assembly incorporates a roller thrust bearing with a reinforcing support which prevents distortion of the bearing in the section of the yoke through which the screw travels. It is available in two sizes handling all liners from $3\frac{1}{2}$ to 9-in. *Grant Oil Tools Co.*



IT'S NEW CHECK IT

37 SE-LECTRIC MANILA ROPE. This new safety rope fights off water and possesses remarkable nonconductivity factors. The new rope was specifically planned for the protection of linemen, maintenance, and other workers who face electrical hazards. Its added safety factors make it ideal for many other uses in construction fields. It requires only 5.00 kv. of voltage impressed on a 5-ft. piece of untreated $\frac{1}{2}$-in. rope to produce 10 ma. of current, while Se-Lectric rope nonconductivity requires 73.00 kv. of voltage to force the same current through. *South Eastern Cordage.*

IT'S NEW CHECK IT

38 REFRASIL, new high-temperature sleeving and a fibrous silica-insulation has application to thermal and electrical insulation problems in petroleum, chemistry, and electronics. A typical new use is that of sleeving as electric space separators in thermocouple leads. This sleeving may be applied with maximum effectiveness where temperatures up to 1,800° F. are encountered. Its light weight and minimum bulk, as well as its unusual flexibility, make it particularly desirable for a specific insulation problem. Sleeving is available in many variations of sizes and lengths, and slipon installation is easily accomplished. Refrasil is now being applied to, or has a potential use for: high-temperature thermal insulation; electric space separators (thermocouple wire insulation); filtration of corrosive or high-temperature materials; catalyst or catalyst support: ion exchanger; and easily removed, flexible, long-wearing insulation blankets. *The H. I. Thompson Co.*

IT'S NEW CHECK IT

REFINING

Sunray Begins Operation of Leased Rock Island Refinery

DUNCAN, Okla.—Sunray Oil Corp. is now operating the former Rock Island Oil & Refining Co. plant just south of here which it leased earlier this summer *(The Oil and Gas Journal, June 21, page 356)*.

Processing equipment in the refinery has been completely remodeled and reconditioned and the plant is now processing approximately 7,000 bbl. of crude per day. The Duncan plant is operating as an adjunct to Sunray's catalytic cracking refinery on the right-of-way of the Rock Island Railroad adjoining the leased property.

Gas oil supplied by the additional distillation units goes as charging stock to the company's catalytic cracking unit. Total crude throughput through the complementing plants is now about 30,000 bbl. daily. Throughput capacity is 35,000 bbl. daily.

F. L. Martin, Sunray's vice president in charge of refining, said the company's sources of crude supply in south-central Oklahoma fields are more than sufficient to handle the enlarged Duncan operation.

Former Rock Island facilities under 4-year lease to Sunray include a crude-oil topping and vacuum plant, a thermal cracking unit, gasoline-recovery unit, the 157-acre refinery site, 382,000 bbl. of crude and products storage, plant utilities, shipping and service facilities, and tank-car and tank-truck loading racks. Lease terms also include a purchase option.

The new addition to Sunray's refining operations in Oklahoma bring total refining capacity in the state to 45,000 bbl. per day. This includes about 10,000 bbl. per day at its Allen thermal cracking plant.

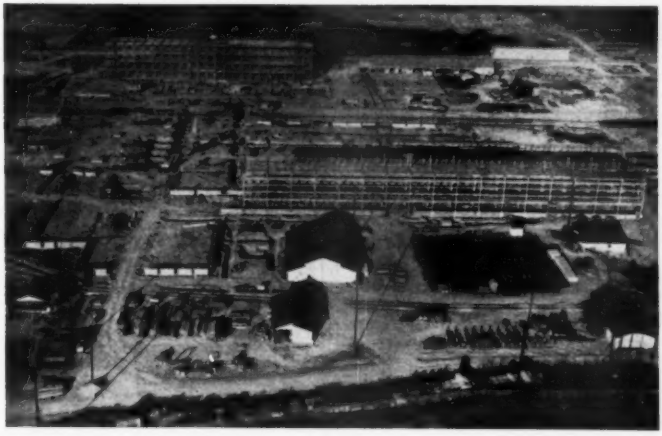
Delta Lets Contract for Crude Stills, Crackers

MEMPHIS.—Delta Refining Co., a wholly owned subsidiary of M. F. A. Oil Co., has contracted for the construction of a new crude-distillation unit and an air-lift Thermofor catalytic cracking unit at its refinery here.

Delta's present crude-cracking capacity of 4,000 bbl. per day will be increased to 6,000 bbl. per day by the new facilities.

The new T.C.C. unit, to have a feed capacity of 3,000 bbl. per day, is designed and licensed by Socony-Vacuum Oil Co., Inc. It will include catalytic polymerization and gas-concentration facilities. Additional storage capacity for 125,000 bbl. of crude and products is also being added to the plant.

Contract for the new construction, for which the company has obtained certificates from Petroleum Administration for Defense permitting rapid amortization, has been let to Koch Engineering Co., Inc., Wichita, Kans.



***RUSHING TO COMPLETION.**—Ethyl Corp.'s new plant on the Houston ship channel will increase the company's production of tetraethyl lead by approximately 30 per cent. National Production Authority and Petroleum Administration for Defense are cooperating so that production of TEL and other special-purpose chemicals will begin next spring. Major engineering and construction contracts are being shared by C. F. Braun Co., and E. B. Badger Process Division of Stone & Webster Engineering Corp. Other contractors include James Stewart & Co., Inc., Fretz Construction Co., and Layne Texas Co.*

For Mid Continent service, call on J. B. Gill Company's Tulsa office

Our Tulsa office, 415-417 Oil Capital Bldg., 507 S. Main St., offers experienced counsel in construction and engineering operations.

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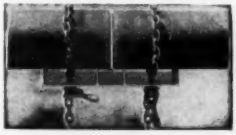

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DELTA GUN — Lightweight, all steel, chrome finish. Easy to carry, easy to load. Fast snap-on, snap-off operation. Develops 10,000 pounds pressure.

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Construction is expected to begin shortly, and initial operation of the new facilities is anticipated by December 1952.

No new construction is planned at present for the parent company's refinery at Chanute, Kans. Recent replacement of a crude fractionator has increased that refinery's capacity from 18,000 to 20,000 bbl. per day.

Federal Oil-Tax Collections Running Well Ahead of 1950

WASHINGTON. — Collections from the three federal taxes on oil are running approximately $4,000,000 a month ahead of last year.

An Internal Revenue Bureau report shows that tax receipts for the first 7 months aggregated $385,000,000 compared with $357,600,000 for the corresponding 1950 period.

Collections included $319,998,618 from gasoline against $301,207,547 last year; $50,422,340 from lubricating oils against $45,177,295, and $14,720,126 from pipe-line transportation against $11,225,377.

July tax receipts included $47,769,146 from gasoline against $46,576,323 in July 1950; $5,833,862 from lubricating oil against $6,096,915, and $2,133,841 from pipe-line transportation against $1,709,108.

Nation-Wide Asphalt Sales, Manufacturing Firm Formed

SAN FRANCISCO.—A nation-wide affiliate of Standard Oil Co. of California has been organized for the manufacture and sale of various types of paving asphalts and special asphalt products.

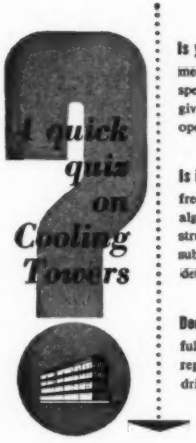
The new firm is American Bitumuls & Asphalt Co., formerly known as American Bitumuls Co. operating in the territory east of the Rocky Mountains. The company, headed by Charles W. Stewart, president, is acquiring the assets of Stancal Asphalt & Bitumuls Co., which has operated in the West. Both firms were Standard of California subsidiaries.

The organization will have 14 district offices, including manufacturing plants and asphalt refineries in the United States and Puerto Rico.

Damage to Phillips' Plant Much Less Than Anticipated

BORGER, Tex.—Phillips Chemical Co. has reported that damage to the company-operated, government-owned, synthetic-rubber plant near here was much less than anticipated after an explosion and fire in the butadiene-purification section on September 1.

A large part of the plant is expected to be reopened soon and the balance will be put back in operation as soon as tanks, motors, and controls are obtained and installed.



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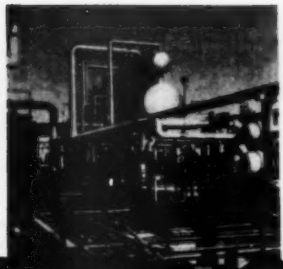
WORLD PETROLEUM

22 New Alkylation Units Planned



Petroleum Administration for Defense approves accelerated amortization for alkylation plants to cost $36 million.

ALKYLATION is currently enjoying a major resurgence as a result of both increased military requirements and the challenge of the high compression ratio automotive engine. This is apparent not only in announcements of new plant construction but even more dramatically in a recent tabulation issued by the Petroleum Administration for Defense in which the PAD lists applications for accelerated amortization. These, including facilities for basic refining, alkylating, production of aromatics and other refining and petrochemical operations, amount to more than half a billion dollars.

Over seven percent of this total will go for 22 alkylation plants and supporting facili-

A large proportion of the proposed increase in capacity can be laid directly at the feet of the aviation industry which has produced the powerful reciprocating engines that require 115/145 grade avgas rather than the 100/130 grade used during World War II.

To produce this grade not only calls for high quality alkylate but also greater production because the problem is further compounded by the fact that today's engines require a blend of which approximately 85 percent may be alkylate, the remainder being largely composed of isopentane and aromatics. This is more than double the 35 percent alkylate content needed in World War II.

Thus, alth[illegible] industry produced [illegible]

The Cameron

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LIFT-PLUG VALVE

- designed especially for alkylation service

This is the valve that was developed expressly for HF and H_2SO_4 Alkylation service. Its performance in this difficult service has been so outstanding that it is now being widely used wherever corrosion, elevated temperatures or high pressures are factors.

The seat, which is separate from, and not attached to, the valve body, may be readily replaced without removing the valve from the line. Obviously, the seat and plug may be had in any desired alloy for special service conditions. The non-lubrication feature eliminates the bother and expense that goes with lubricated valves, and prevents product contamination. The valve operates with remarkable ease and seals tightly without the aid of lubricant.

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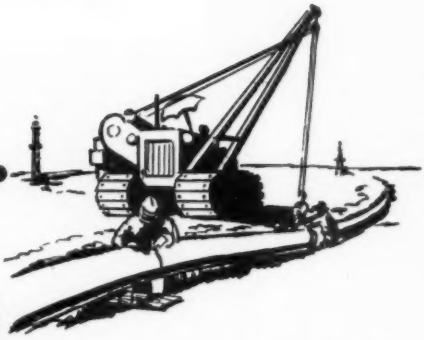
IN LAYING PIPE...



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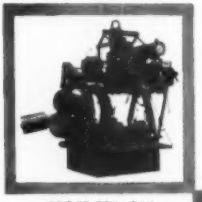
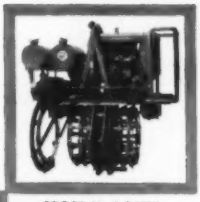
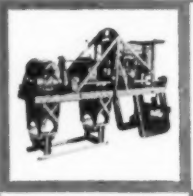


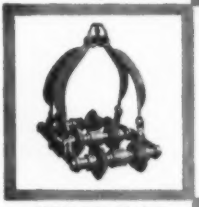
CROSE 22" - 26" Line-Traveling COATING and WRAPPING MACHINE



CROSE Model "K" PIPE CLEANING and PRIMING MACHINE



CROSE Auger-Type ROAD BORING MACHINE



CROSE PIPE CRADLE

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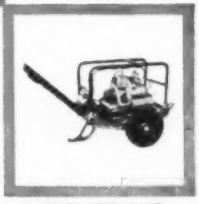
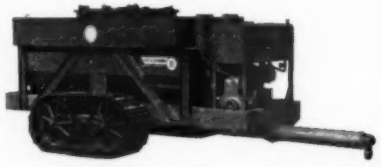
Asbestos Felt
Kraft Paper
Rock Shield

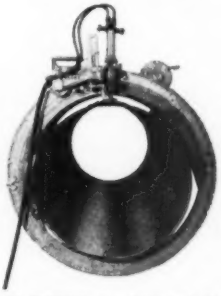
CROSE INTERNAL LINEUP CLAMP



CROSE 1500 WATT SELF-PROPELLED GENERATOR



CROSE-LITTLEFORD 23 BARREL PIPE COATING KETTLE
These kettles are also available in both 10 and 30 barrel capacity. Patch kettles are also available.



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PIPE LINES

Conoco to Get Pipe

PAD approves building of two Southwest crude lines

PONCA CITY.—The Petroleum Administration for Defense has granted approval to Continental Pipe Line Co. for the construction of two crude-oil pipe-line projects in the Southwest. Total expenditure for the two lines will come to $7,900,000, according to W. L. Kygar, president, who announced that construction is expected to get under way soon.

Largest of the two projects is the $5,900,000 12-in. line that will extend approximately 225 miles from Wichita Falls, Tex., to Ponca City, Okla. The line, with an initial daily capacity of 40,000 bbl., will carry crude from Montague, Clay, Throckmorton, Archer, Wichita, and Young counties of North Texas to Continental's refinery.

First deliveries of pipe for this line are scheduled for the second quarter of next year.

The second line is a $2,000,000 8-in. line extending 105 miles from Rincon field in Starr County, South Texas, by way of McAllen to Port Isabel *(The Oil and Gas Journal, August 9, 1951, page 58)*. The line will have a 17,000 bbl. daily capacity and move crude from the Rincon area to Port Isabel. In addition, stabilized distillate from a cycling plant near McAllen and crude from the McAllen area will be carried to Port Isabel for Taylor-Mayfair Co.

Continental has arranged for first shipments of pipe to arrive during the last quarter of this year on the Rincon field-Port Isabel line, the remainder in 1952.

No contract has been let as yet for either of the lines.

Rice Institute is a 50 per cent partner with Continental in the construction of the Rincon line.

Plantation Completes New Baton Rouge-Bremen Line

ATLANTA.—Plantation Pipe Line Co. has completed its new 432-mile, 18-in. products line from Baton Rouge to Bremen, Ga.

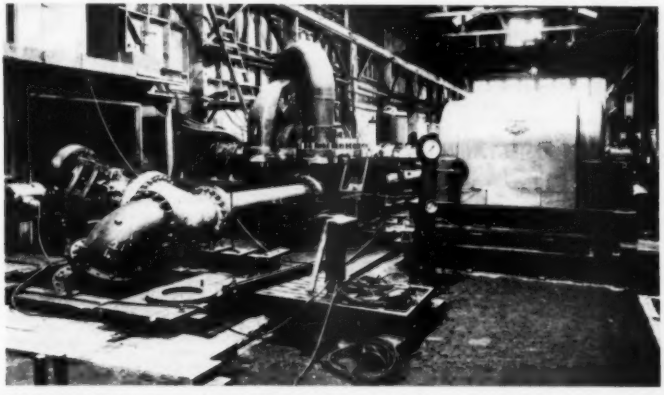
First delivery of products was made at Meridian, Miss., early this week, according to C. R. Younts, Plantation president. Filling and testing was carried out last week, Younts said.

Williams Brothers Co., constructors of both the Baton Rouge-Bremen line and 14-in. section running 275 miles from Bremen on to Charlotte, N. C., has laid pipe as far as Spartanburg, S. C., on the latter project.

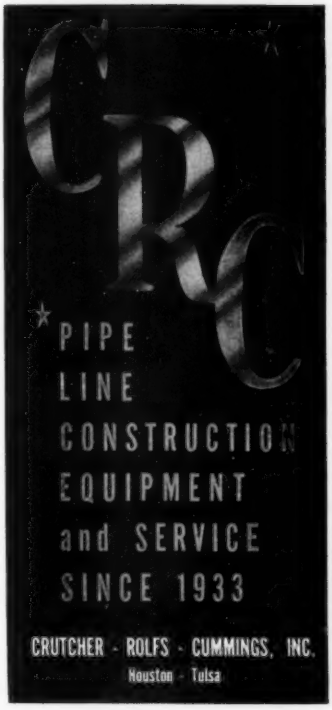
Contract for both sections was let to Williams Brothers late in October 1950. Consideration was $7,000,0000 *(The Oil and Gas Journal, September 2, 1950, page 29)*.

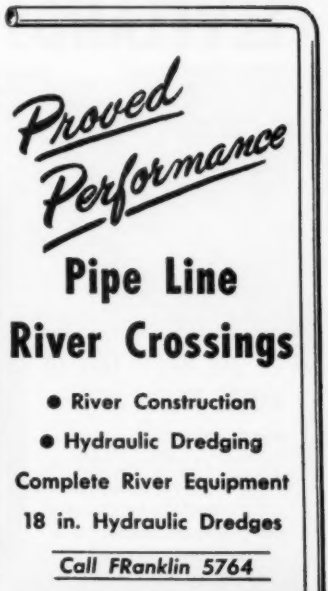
The building of five intermediate pump stations along the line will commence September 15. Contract for their construction is held by P & W Construction Co., while contract for installation of piping was let to Latex Construction Co. of Georgia.

New Plantation facilities completed,



MONSTER PUMP.—Shown here is the largest centrifugal pump ever built for oil-pipe-line service. The big pump, capacity of 350,000 bbl., was tested recently at United Centrifugal Pump Co.'s plant at Oakland, Calif., and will be installed soon at Basin Pipe Line System's Hamlin, Tex., station. Seven sister units of the same size are scheduled to be installed later along the lengthy Basin and Ozark system which runs from Jal, N. M., to Patoka, Ill., along with 32 smaller units.





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under way, or soon to begin on lines, stations, and terminals will meet total requirements of more than 200,000 bbl. of products per day by 1960.

Service Buys West Texas Crude-Gathering Systems

Service Pipe Line Co., Tulsa, has assumed control of two crude-oil gathering systems in West Texas formerly owned by Magnolia Pipe Line Co. and B. C. Pipe Line Co.

A gathering system serving the Dean (West Levelland) area was acquired by Service from Magnolia. It includes about 25 miles of 2 to 4-in. lines serving 94 wells on 22 leases now producing about 1,600 bbl. of oil per day, subject to Texas Railroad Commission allowables.

About 20 miles of 6 and 4-in. pipe was acquired from B. C. Pipe Line Co. The lines connect Yellowhouse pool in Hockley County with the Consumers Cooperative refinery at Levelland.

Texas Eastern Contracts for Two Ohio River Crossings

SHREVEPORT, La.—Texas Eastern Transmission Corp. has awarded contracts for two more river crossings as part of construction of its 791-mile, 30-in. natural-gas line from Kosciusko, Miss., to Connellsville, Pa.

A contract for construction of a crossing of the Ohio River on the Kentucky-Ohio border has been awarded to Pentzien, Inc., of Omaha.

Williams Brothers Co., Tulsa, was awarded contract for a crossing of the Ohio on the Ohio-West Virginia border.

Texas Eastern let contracts previously to Pentzien for construction of 30-in. submarine crossings of the Cumberland and Kentucky rivers and to Oklahoma Contracting Co., Inc., Dallas, for a 30-in. crossing of the Tennessee River *(The Oil and Gas Journal, August 16, page 178)*.

Pipe-Line Runs, Revenue Gain in Second Quarter

WASHINGTON. — A total of 771,687,801 bbl. of oil moved through the systems of the nation's 51 largest pipe-line companies during the second quarter of this year to give them an aggregate transportation revenue of $119,690,776.

In the same period last year, the 50 companies then reported by the Interstate Commerce Commission moved 636,081,558 bbl. of oil for a transportation revenue of $95,704,756.

The ICC figures cover those pipeline oil carriers having annual revenues of more than $500,000. Well over half of the total oil moved was handled by 10 systems.

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PRODUCTS
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Old established company, now manufacturing devices for oil field use, with office in Tulsa and representatives traveling Mid-continent and Texas fields, would consider additional products for manufacture and sale for oil field, refinery or pipe line use. Plant located adjacent to excellent water shipment facilities for domestic and export trade.

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While Service Pipe Line Co. reported the greatest transportation revenue, $13,738,721 from 44,126,272 bbl. of oil, the greatest volume was reported by Humble Pipe Line Co., 75,420,750 bbl. from which revenue of $10,643,865 was derived.

Other pipe lines moving more than 25,000,000 bbl. of oil during the quarter included Texas Pipe Line Co., 51,060,148 bbl. for a revenue of $7,364,485; Gulf Refining Co., 46,603,391 bbl. for $7,548,763; Buckeye Pipe Line Co., 42,462,528 bbl. for $2,157,225; Magnolia Pipe Line Co., 41,608,820 bbl. for $8,261,506; Sinclair Pipe Line Co., 40,608,291 bbl. for $9,244,604; Ohio Oil Co., 35,647,761 bbl. for $3,343,329; Shell Pipe Line Corp., 34,931,026 bbl. for $6,585,132, and Interstate Oil Pipe Line Co., 33,621,921 bbl. for $4,957,367.

Sunray Boosts Throughput With New Booster Station

Sunray Pipe Line Co. has placed a temporary booster station in operation at Bearden, Okla., along the firm's products line from Allen to Duncan, Okla.

The station will be operated as a permanent installation as part of an expansion project scheduled for completion in early fall.

Throughput of Sunray's products line from Allen to a connection with Great Lakes Pipe Line Co.'s system at Drumright has already been increased 6,000 bbl. of products per day through operation of the new station.

Present increased throughput of the Allen-Drumright line is 35,000 bbl. per day.

Columbia Subsidiaries Plan New Appalachian Gas Lines

WASHINGTON. — Cumberland & Allegheny Gas Co. and Manufacturers Light & Heat Co., both subsidiaries of Columbia Gas System, Inc., have asked the Federal Power Commission for authority to build natural-gas pipe-line facilities in Maryland, Pennsylvania, and West Virginia to help secure the greatest possible production of gas from fields in Maryland and West Virginia.

Cumberland plans to build about 46 miles of line, install 2,080 hp. at two new compressor stations, and convert an existing station to two-stage operations. Manufacturers plans construction of a short line in Fayette County, Pennsylvania.

Cumberland's new 10-in. line would extend 35 miles from the Mountain Lake Park, Md., area to a connection with Manufacturers system on the Pennsylvania - West Virginia State Line in Monongalia County, West Virginia.

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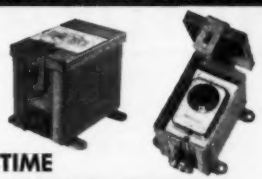

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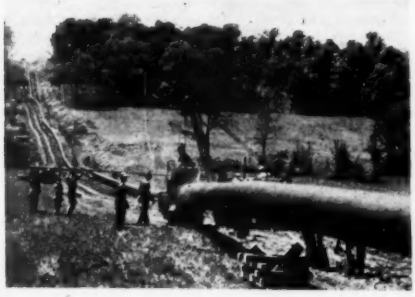

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NATURAL GAS

Revenues Gain

FPC finds taxes, sales incomes, costs increase

WASHINGTON. — Operating revenues of 83 natural gas companies subject to Federal Power Commission control were 24.3 per cent higher in the 12 months ended with last June than in the preceding comparable period.

Figures just compiled on the operations of the reporting companies show that operating revenue was $1,449,291,533 compared with $1,165,704,870 in the preceding 12 months. Operating income was $227,519,894, an increase of 15.4 per cent over the $197,211,291 reported for the period ended June 1950.

Gas sales to ultimate consumers totaled 2,147,522,000 M.c.f., a 17.5 per cent increase. Sales to other gas utilities were 3,711,111,000 M.c.f., an increase of 24.3 per cent, bringing total sales for the period to 5,858,633,000 M.c.f., an increase of 21.7 per cent.

As of June 30, 1951, the commission found, the net gas utility plant of the reporting companies aggregated $3,402,465,447, an increase of $573,333,938, or 20.3 per cent, over the $2,829,131,509 reported for the same date in 1950.

Total operating expenses increased 23.4 per cent and an increase of 27.6 per cent was recorded in the cost of purchased gas to $611,617,908.

Depreciation and amortization amounted to $108,980,937, up 15.2 per cent, and taxes jumped 50.6 per cent to $191,789,095. In the latter field, payments of federal income taxes increased 77 per cent while those of state and local taxes were up only 17.8 per cent.

Net income of the 83 companies, after taxes, was $183,180,421 against $167,550,009, an increase of 9.3 per cent.

OPS Turns Thumbs Down on 12-Cent Woodlawn Gas Price

WASHINGTON.—Appeal of Stanolind Oil & Gas Corp., Tulsa, and the Continental Oil Co., Ponca City, Okla., for a 2-cent increase in the price of gas to be sold the Mississippi River Fuel Corp., St. Louis, has been denied by the Office of Price Stabilization for the second time.

The two producing companies sought approval of a 12-cent per M.c.f. rate measured on the Texas pressure base of 14.65 psi. absolute at well head for natural gas produced in the Woodlawn field in Texas. The OPS petroleum branch denied the request August 22 and established a ceiling of 10 cents per M.c.f., in line with other prices in the same general producing area.

The companies appealed the decision and, in a conference with OPS, argued that the potential reserves of the field are large and that consequent large investments in equipment justify a rise in price. It was also contended that the negotiations with Mississippi River Fuel Corp. for the 12-cent rate were completed before the December 19, 1950-January 25, 1951, base period, although formal contract was not entered into during that time.

In its second rejection of the price increase, O. D. Judd, chief of the petroleum branch, conceded that the company had made valid points but pointed out that "if the Woodlawn gas was evaluated on a strict comparative price with North Lansing a ceiling price of 9.02 cents per M.c.f. might have been the result."

New Low Cost "City" Gas Plant Placed in Operation

ROCHESTER, N. Y.—A new low-cost gas-producing plant capable of reforming natural gas or manufacturing a gas which can augment natural at periods of peak demand has been placed in operation at Rochester Gas & Electric Corp.'s plant here.

The little unit, 10 ft. high excluding cooling tower, can produce more than a million cubic feet of manufactured gas per day using gasoline, propane, butane, light oil, or natural gas as raw materials. The finished gas can be made to range in heat content from 300 to 1,050 B.t.u.

The new plant was built as a demonstration unit by the engineering and construction division of Koppers Co., Inc. Koppers has secured world patent rights for the process from Leonard Hasche, inventor. The process will be called Koppers-Hasche.

According to J. Hawley Taussig, Jr., of Koppers, the process also is attracting attention of chemical industries. Taussig said the process can be made to produce synthetic benzene, ethylene, and acetylene with only minor changes in raw materials or production procedures.

Natural Gasoline

Luby Expansion Doubles Propane, Butane Output

BISHOP, Tex. — Stanolind Oil & Gas Co. and Seaboard Oil Co. of Delaware, coowners of Luby Gasoline Plant, have completed an expansion program begun at the plant in March.

The revamped plant will be able to process 27,000,000 cu. ft. of gas per day operating at peak capacity. It will recover 31,000 gal. of natural gasoline and 21,000 gal. of butane-propane mix per day—about double its previous output. It will inject 10,000,000 cu. ft. of stripped gas per day into the oil-producing formation.

New equipment includes a low-pressure gathering system to collect and deliver casing-head gas to the plant, additional compressors to raise total horsepower to 6,640, a new 1,000 psi. absorber, facilities for transmission of gas for sale, a steam condenser, a direct-fired oil heater, and additional storage facilities.

The latest construction at Luby is the fourth enlargement made since the plant was built in 1939. Engineers for Stanolind, plant operator, handled design for the expansion, and Gasoline Plant Construction Co., Houston, carried out construction.

$900,000 Expansion Set For Pecos L.P.G. Plant

PECOS, Tex.—Production of natural gasoline, butane, and propane at Pecos Petroleum Co.'s plant 35 miles north of here will be increased substantially by a $900,000 expansion program planned as a joint venture with El Paso Natural Gas Co.

T. C. Shaw, executive vice president and general manager of Pecos, said production of natural gasoline will be stepped up by about 10,000 gal., while butane and propane output will be increased by about 12,000 gal.

The company will build about 15 miles of pipe line to a connection with El Paso's line in New Mexico. The field gathering system will be extended, and about 2,500 additional horsepower in compressors will be installed in the plant. In addition, Pecos will revamp distillation and absorption units and build housing for company personnel.

Hugoton to Double Capacity Of Ulysses Absorption Plant

WICHITA. — Hugoton Production Co. has been granted authority by the Kansas Corporation Commission to double capacity of its natural-gasoline-absorption plant near Ulysses, Kans.

Gas-processing capacity of the plant will be increased from 70,000,000 to 140,000,000 cu. ft. The plant will be able to produce 52,000 gal. of L.P.G. and about 40,000 gal. of 12 to 26-lb. R.v.p. natural gasoline per day. Kansas Power & Light Co. will be sold residue gas.

Among the

Drilling Contractors

McConnell and Rains In New Drilling Firm

Fred McConnell, president and operations manager of Lee Drilling Co., Tulsa, and L. L. Rains, drilling superintendent of this company with headquarters at Odessa, Tex., have resigned their respective positions and connections with this company to enter the drilling contracting business for themselves.

They will operate under the name of Diamond Drilling Co., a newly formed company, of which McConnell is president, and Rains, vice president in charge of field operations. Tom Prior, former petroleum engineering student at the University of Tulsa, and who for the past year has been working in the oil fields, will be associated with them in the new company.

The new company is starting with two rotary rigs, which, for the time being, will be operated in the West Texas district. Headquarters of the company will be at Tulsa, where McConnell will be located. Rains will continue to headquarter at Odessa.

McConnell has been associated with Lee Drilling Co. for 15 years. Rains has been with that company 21 years, starting as a roughneck.

Saddler at Abilene

Saddler Drilling Co., formerly located at New Harmony, Ind., has established offices at Abilene, Tex., and has moved its rotary rig to that area.

Olson Brothers Form New Drilling Co.

L. H. Olson, Midland, and S. A. Olson, Fort Stockton, Tex., both of whom have been associated with their brother, A. O. Olson, Tulsa, in the Olson Drilling Co., recently dissolved, have formed a drilling contracting company of their own to be known as the L. H. & S. A. Olson Drilling Co. Operating headquarters have been established at Midland. The new company is starting with one rotary rig, now operating near Fort Stockton, in Pecos County.

L. H. Olson, who has been manager of Olson Drilling Co.'s operations in the Permian basin district with headquarters at Midland for the past 11 years, has been active in the drilling business for more than 34 years. S. A. Olson, who has been supervisor of field operations of that company for 7 years, working out of Fort Stockton, has been in the business for 28 years. Work of both has extended over many states, including Texas, New Mexico, Oklahoma, Kansas, Illinois, Colorado, and Wyoming.

Wheless Drilling Co., Shreveport, has a rig running for Skelly Oil Co. in the Athens field, Claiborne Parish, northern Louisiana. Present operation is 1 Stevenson, C SE SE 23-20n-6w, a Hosston zone test.

Sterling Drilling Co., Sterling, Kans., has moved in for a wildcat test to be drilled for Plains Exploration Co. at 1 Morrison, NW NW NW 24-8n-54n, Logan County, Colorado.

Sunnyland Contracting Co. is the contractor on a projected 7,000-ft. Wilcox sand test which Humble Oil & Refining Co. is starting 2½ miles southwest of the Jeanette townsite, south of the Cranfield field, Adams County, Mississippi.

Justiss-Mears Drilling Co., Jena, La., has taken on a contract for a 10,500-ft. test which W. A. Moncrief of Fort Worth has projected for the Pearl Lake prospect, 6 miles west of Longbridge, Avoyelles Parish, Louisiana. The test is 1 Virgil Descant.

Barbour Drilling Co., Tulsa, is drilling for Flynn Oil Co. at location ¾ mile northwest of production of the Garden Grove pool, 2 miles east of Prague, Lincoln County, Oklahoma. Location is for 1 Nash, NW NW SE 26-12n-6e. Hole is projected to the second Wilcox sand around 4,700 ft.

Lyle & Sims are drilling for Niloco and associates at 1 Payne, NE SE NE 7-30n-66w, in the Spanish Diggins area, Platte County, Wyoming. Hole will be carried to the granite, expected around 2,000 ft.

Lyle Cashion, Inc., Jackson, Miss., has started a 5,100-ft. wildcat test for Harris & Payne at 1 Mauldin, NE SW SW 21-9n-6w, 2½ miles southwest of Tokio, Wayne County, Mississippi.

Nowery Drilling Co., Inc., Shreveport, now has the only active rig in the Big Creek field, Richland Parish, Louisiana, where it is starting a new well for Stanolind Oil & Refining Co. at 29 Delta, in 3-16n-7e.

Viersen & Cochran, Inc., Okmulgee, Okla., will drill a 13,500-ft. wildcat test for Ashland Oil & Refining Co. in the Criner area, McClain County, Oklahoma. The location, 1 Caviness,

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Houston 12, Texas. Phone: WEntworth 6603

is 2 miles west and slightly south of the town in the C NW SE 27-6n-4w.

Crescent Drilling Co., Monroe, La., has contracted with Carter Oil Co. for a wildcat test, 1 Hope Fee, to be drilled near Boeuf Bayou, in Morehouse Parish, Louisiana. Contract is for a test to the Smackover lime, or 6,500 ft. Location is in the C SW NE 7-21n-9e.

Lyons, Prentiss & McCord, Shreveport, are starting another exploratory test for Natural Gas & Oil Corp. Latest operation is 6 Urania, located in 4-10n-2e, 3 miles south of Olla, LaSalle Parish, Louisiana.

E. K. Carey Drilling Co., Denver, has a rig working for Morton & Sons, Long Beach, Calif., on a projected 8,000-ft. Morrison sand test in the Pine Bluffs area, Laramie County, southeastern Wyoming. Present operation is 1 Rauner, C NE NW 31-13n-60w.

E. A. Rumley, Oklahoma City, is moving a rig to a location south of the Mammoth pool, west of Meeker, in Lincoln County, Oklahoma, where he has the contract for a Wilcox sand test to be drilled for Gulf Coast Western Oil Co. Location is on the Moody lease in the SW SW NE 22-12n-2e. Operators expect their objective around 5,700 ft. Rumley also has an operating interest in the test.

Sallee Brothers Drilling Co., Evansville, Ind., has the rotary contract on a wildcat test which Hem Oil Co. of Cedar Falls, Iowa, is starting at 1 Joyner, SE NE SW 3-N-22, Henderson County, western Kentucky.

Lyle Cashion, Inc., Laurel, Miss., is drilling on a 7,200-ft. contract with Lion Oil Co. at 1 Tom, a wildcat located in 3-4n-1e, 4 miles southeast of Knoxville, Franklin County, Mississippi. Location is 6 miles south of the recently opened South White Apple field.

Trans-Tex Drilling Co., Longview, Tex., is drilling for H. D. MacDonald at a wildcat location 3 miles northeast of Wells Point, Van Zandt County, eastern Texas. Location is for 1 Burnett, in the George H. Knust Survey.

Survey Drilling Co., Dallas, has contracts for two wildcat tests to be drilled for Gulf Refining Co. near the Fenwick townsite, in Adams County, Mississippi. Both tests will be on the Whittington lease in 34-7n-1w. Contracts call for tests to 6,700 to 6,800 ft.

Perl Smith is the contractor on a wildcat test which C. D. Edmonson has projected for the area east of Chappell, in Deuel County, western Nebraska. Location is on the operator's Lindsay lease in the NW NW NW 4-12n-44w. Hole will be carried through the Dakota series.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 9-3-51	Change week ended 8-27-51	Change week ended 9-4-50
Gulf Coast	601	+ 9	+ 74
W. Tex.-N. M.	987	+15	+255
Ark.-N. La.-E. Tex.	166	+ 6	+ 24
Oklahoma	311	+ 7	+ 30
Kansas-S. Nebraska	192	+10	+ 65
Illinois-Eastern	139	—11	+ 27
Rocky Mountains	191	+14	+ 71
Pacific Coast	183	— 3	+ 42
Total United States	2,770	+47	+593
Western Canada	157	+ 6	+ 58
Total	2,927	+53	+651

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 176 and 177.

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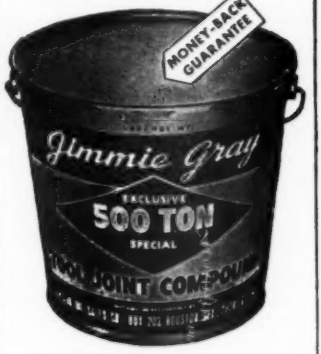

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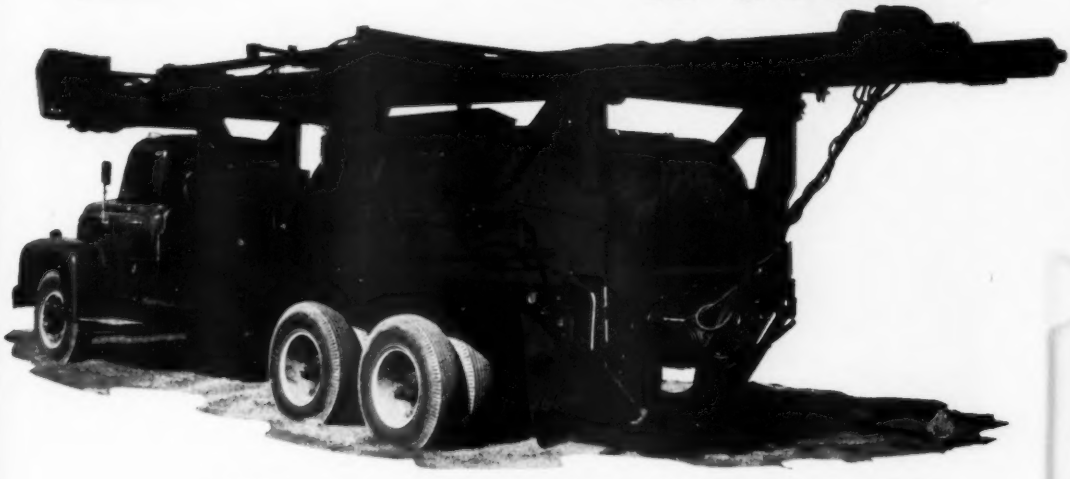

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1. Unique design of motor mount permits proper distribution of load on truck or trailer.
2. Low center of gravity, note that height of unit is no more than height of truck cab and mast clears cab by inches. It's safe and easy to road.
3. Height, width, weight and length meet most exacting road regulations.
4. Allis-Chalmers Medium Speed Engine built especially for heavy duty stationary service has plenty of cooling capacity and every modern feature of design. This means longer life, fewer overhauls, and lower operating cost.
5. It has heavy tractor type 4 speed transmission, built to take the high torque of the Allis-Chalmers engine.
6. Air operated positive drum clutches are easy and fast for the operator—No Slipping, No Lining—years of trouble free service.
7. Brakes are Cooper patented Air Cooled self-energizing, alloysteel, and center mounted to compensate for expansion. Built in two sizes—36" dia. x 6" wide, or 42" dia. x 8" wide.
8. Eight Line speeds on drum from 47' pm to 815' pm and a maximum line pull of 38,000 lbs. on single line.
9. Line Capacity on 42" drum is 8,600' of ¾", on 36" drum, 6,600' of ¾".
10. All Steel truck bed with plenty of room for air compressor and tools.
11. Telescoping mast with rod hanger and tubing board, which automatically swing into position as mast is raised. Locking dogs automatically lock upper section in place and are tripped from the ground when lowering—No need for a man to be on the pole when setting-up or lowering mast.
12. Mast can easily be dis-connected from unit and left standing and winch unit can be removed from truck in a matter of minutes.

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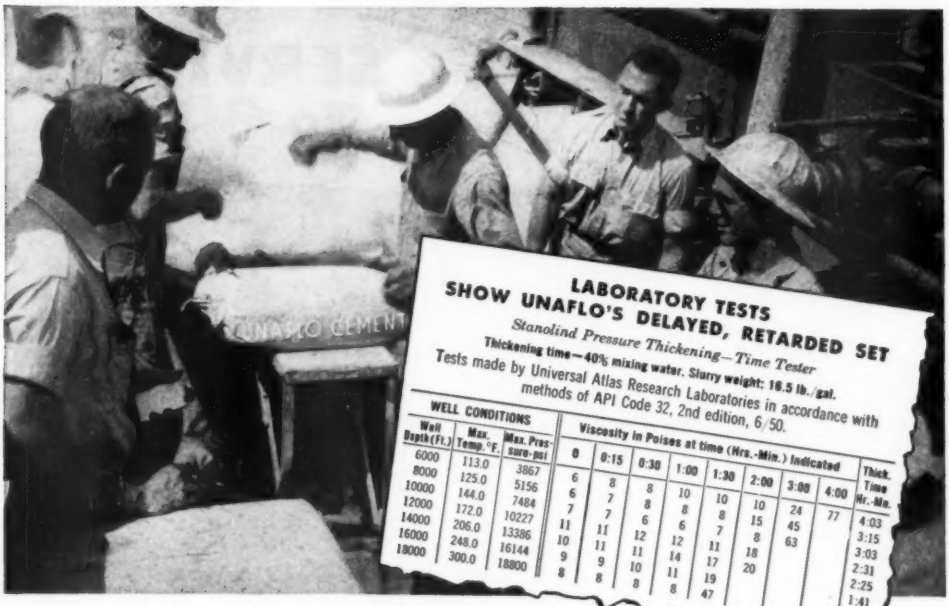

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Stanolind Pressure Thickening—Time Tester

Thickening time—40% mixing water. Slurry weight: 16.5 lb./gal.

Tests made by Universal Atlas Research Laboratories in accordance with methods of API Code 32, 2nd edition, 6/50.

WELL CONDITIONS			Viscosity in Poises at time (Hrs.-Min.) indicated							
Well Depth (Ft.)	Max. Temp. °F.	Max. Pressure-psi	0	0:15	0:30	1:00	1:30	2:00	3:00	4:00	Thick. Time Hr.-Min.
6000	113.0	3867	6	8	8	10	10	10	24	77	4:03
8000	125.0	5156	6	7	8	8	8	15	45		3:15
10000	144.0	7484	7	7	6	6	7	8	63		3:03
12000	172.0	10227	11	11	12	12	11	18			2:31
14000	206.0	13386	10	11	11	14	17	20			2:25
16000	248.0	16144	9	9	10	11	19				1:41
18000	300.0	18800	8	8	8	8	47				1:33

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Unaflo isn't just another "slow-setting" cement. A slurry of Unaflo stays fluid and pumpable throughout the retardation period. That has been proved in the laboratory (see chart above) and in hot, deep holes all over the world.

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OG-U-122

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Reef Developments South of Leduc

RECENT weeks have seen significant developments in reef production south of the current concentration of drilling activity in the Leduc area of Alberta.

Devonian-D2 production has been found 30 miles south of Big Valley; Devonian-D3 production has been found considerably deeper in the Alberta syncline than heretofore; a D2 discovery has been indicated about halfway between Stettler and Big Valley; and not far south of Leduc, at Wizard Lake, a well has cut nearly 300 ft. of D3 without finding water.

At C on map is Dome Exploration (Western), Ltd., and Naco, Ltd., 30-14 Drumheller which tested over 1,000 bbl. of 30°-gravity oil from 30 ft. of D2 above 5,400 ft. This discovery well found sulfur water in the D3 and is now being completed in the D2. Except for some off-the-beaten-track D2 production of as yet unevaluated importance at Princess field, 70 miles to the southeast, the Drumheller wildcat has proven the farthest south D2 production.

Recently completed as a gas-condensate well is A. G. Bailey Co., Ltd., 1 Olds, D on map. With production from perforations at 8,100-12 ft., this strike is the deepest Alberta reef discovery to date. The wildcat had an open flow potential of 50-70 M.M.c.f. of gas and 700 bbl. of condensate daily from the D3 (originally thought to be D2).

Bailey's strike, considerably west of the trend of reef fields between Drumheller and Leduc (not all fields are shown on location map), has resulted in increased interest in reef potentialities in the deeper portion of the basin. Another wildcat that has added to this interest was drilled about 20 miles north and east of the Bailey well. Though completed dry, this wildcat found porosity in both of the Devonian sections.

Between Stettler and Big Valley, both D2 and D3 producers, Gulf Oil Corp. 10 Gough, B on map, is coring D2 below 5,244 ft. This well tested water-free 31°-gravity oil at rates of 50-70 bbl. hourly from 36 ft. of D2 above 5,211 ft. The bottom of the hole at the time this drill-stem test was made was 90 ft. above the water level at Stettler, 8 miles to the north. This is mentioned only as a matter of interest and not as a prediction because reef water levels cannot be predicted. The 10 Gough is to be carried down to test the D3.

Just 5 miles south of the Calmar section of the Leduc-Woodbend area, at A on map, Texaco Exploration Co. and McColl-Frontenac Oil Co., Ltd., B-2 Wizard Lake has cut nearly 300 ft. of oil-saturated D3 reef without finding water. This thickness of reef buildup is surpassed in Alberta only by that found at Golden Spike where one well had 613 ft. of oil-saturated reef above water.

Texaco B-2 is ¼ mile south of the Wizard Lake discovery well which initialed 500 bbl. of oil daily from 11 ft. of D3 after finding a substantial flow of gas in the basal Upper Cretaceous-Viking sand, commercial oil production in the Lower Cretaceous, and a thick oil-bearing D2 section. A third well in the pool, Texaco B-3, ¼ mile east of the discovery, stopped 95 ft. in the D3 without seeking the water level and was completed in that section for over 2,000 bbl. of oil daily. The D3 reef at Wizard Lake was topped about 400 ft. lower than the water level in the main portion of Leduc-D3 and 250 ft. lower than the D3 water level at South Calmar.

The development of reef production in Alberta is not considered any less tricky today than it was 4 years ago when the oil world became reef conscious. Rapid buildups and "dropoffs," and the resulting variations in water tables within short distances, make nearly every reef-bound well a "wildcat." Fields cannot be delineated like those controlled by structure or simple stratigraphic traps. Though it's going to take lots of drilling before the ultimate significance of any one of these new discoveries can be determined definitely, the current picture is one of concrete support to the often-made statement that "Alberta's reef potentialities are enormous."

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

NORTH DAKOTA.—Amerada Petroleum Corp. 1 Harry Bakken, 12 miles north of Amerada's Tioga area discovery, flowed oil in 40 minutes on drill-stem test at 8,304-60 ft. in what is tentatively called the Madison formation.

ALBERTA.—Canadian Superior Oil Co. of California has found 77 ft. of water-free Devonian-D2 reef at its wildcat 2¾ miles southwest of the Duhamel-Devonian area.

WEST TEXAS.—Deep Rock 1 McCary, 6 miles north of Big Spring, ran a 40-minute drill-stem test in the Pennsylvanian at 9,038-64 ft., had gas in 4 minutes, oil in 14 minutes, then sprayed oil, gas, and mud until closed, and unloaded oil when pipe was pulled. Sinclair 3 Tippett found additional Ellenburger pay in a 5-hour drill-stem test from 13,043-93 ft. which yielded 3,980 ft. of high gravity oil, with no water.

NORTH TEXAS.—Seaboard Oil Co. 1 Hanks, Nolan County, developed salt water in further reef tests, limiting its prospective pay zone to 25-30 ft. In Montague County Standard of Texas 1 Etter, conglomerate discovery southeast of Nocona, rated a daily potential of 1,518 bbl. of oil a day, gaged through ½-in. choke.

Oklahoma

Major County Wildcat Gets Oil-Gas Showings

EXPLORATION in western Oklahoma received additional encouragement from promising oil and gas showings encountered by Sinclair Oil & Gas Co. in its 1 Campbell, C NE NW 36-23n-16w, a rank wildcat in northwestern Major County. Showings were in Mississippi lime, in which a 90 minute drill-stem test at 7,393-7,415 ft. got a fair gas flow, estimated initially at 22,000 cu. ft. per day, and filled 300 ft. of heavily oil and gas-cut mud along with 500 ft. of muddy salt water and 15 ft. of gas-cut mud. Operators at latest report were drilling ahead.

Location of this test is about 30 miles northwest of the Ringwood pool, nearest production, in the eastern part of the county. It is 5 miles east of Sherman and about 11 miles south of Waynoka, Woods County.

Magnolia Petroleum Co. is making a good Hoxbar producer at its 1 Tugman, SE NW NE 11-2n-8w, north offset to Shell Oil Co. 1 Tugman, recently completed discovery well west of Marlow in northern Stephens County. Following a succession of tests in lower zones, operator perforated casing at 6,048-56 ft., from which zone the well flowed 238 bbl. of 37°-gravity oil in 14 hours through 5/16-in. choke with a gas-oil ratio of 500 cu. ft. per barrel. Shell's discovery well is producing from intervals at 6,606-16 ft. and 6,656-70 ft., but also showed for a good producer from the same zone in which the Magnolia well is being completed.

Helmerich & Payne, Inc., 1 Cope, NE NE SW 2-8n-3e, which is opening a new pool in central Pottawatomie County, swabbed 49 bbl. of oil and 12 bbl. of water during a 4-hour period while testing. Production is from Viola lime and sand stringers in the top of the underlying Simpson section. Total depth is 5,095 ft. with hole open from 5,070 ft. Top of the Viola is 4,960 ft. Location is 1¼ miles east of the Morvin pool.

In the same county, the recent Booch sand discovery made by Flynn Oil Co. and designated as the North Sancho pool is being confirmed by a second well, a north offset to the discovery producer. The confirmation well, Flynn Oil Co. 1 Duncan, SW SE SE 29-9n-7e, swabbed at the rate of 2 bbl. of oil per hour while testing the pay in open hole at 3,402-18 ft. Drilling is under way at an east offset to the discovery.

Midstates Oil Corp. 1 Miller, NW NW NE 20-28n-2w, east offset to the discovery well of the Northwest Doe Creek pool, northwestern Kay County, has confirmed the Simpson production opened by the discovery well. With casing perforated in that pay at 4,600-15 ft., the well flowed 140 bbl. in the first 18 hours through 14/64-in. choke with 340 psi. tubing pressure. Later, it flowed 162 bbl. in 24 hours through 12/64-in. choke. It is the third producer for the field, but the second, a northeast offset to the discovery producer, failed in the Simpson and was completed in the Mississippian as a small pumper.

Gulf Oil Corp. has extended the West Sentinel pool, Washita County, ¾ mile to the east at its 1 Walker, C NE SW 9-8n-20w, which flowed 117 bbl. of 32°-gravity oil in the first 12 hours through 1-in. choke. Production is from open hole at 5,532-45 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Grady County: Magnolia Petroleum Co. 1 Charles Maurer, NW SE 21-5n-5w, flowed 2.3 M.M.c.f. gas plus 16.4 bbl. 53.3°-gravity distillate daily from Springer sands at 10,421-70 ft., 10,502-22 ft., and 10,536-54 ft., TD 11,336 ft.

Lincoln County: Delaney Drilling Co. 1 State, NW SW SW 16-13n-5e, flowed 164 bbl. 48°-gravity oil daily from Hunt at 4,762-82 ft., TD 4,782 ft. New zone discovery in East Sparks.

Pottawatomie County: Herman Brown and J. F. Smith 1 Walker, SW NE SW 18-17n-2e, pumped 217 bbl. 34.50°-gravity oil daily from second Wilcox at 6,134-49 ft., TD 6,149 ft. Discovery is 4 miles S of West Burnett field.

OKLAHOMA WILDCAT FAILURES

Caddo County: Amerada Petroleum Corp. 1 Silverhorn, SW SW SE 24-6n-13w, dry, TD 4,239 ft.

Coal County: Wabash Oil Co. 1 Fisher, SW NW NE 4-1n-8e, dry, TD 5,945 ft.

Comanche County: W. B. Grant 1 Kirkland, SE SE SE NW 4-2n-10w, dry, TD 1,897 ft.

R. W. Place 1 Morgan, NE NE NE SW 35-2n-11w, dry, TD 402 ft.

Kay County: Randall R. Morton 1 Spore, SW SW NE 21-27n-2e, dry, TD 4,066 ft.

Falcon Seaboard Drilling Co. 1 Glen, SW SE SW 8-28n-4e, dry, TD 3,683 ft.

Latimer County: G. R. Haynes 1 Bennett, SE SE NE 12-4n-18e, dry, TD 3,000 ft.

Noble County: San Mizel 1 Main, NW NW NE 18-23n-1e, dry, TD 4,489 ft.

Krow & Gillespie 1 O'Donnell, NE NE SW 1-23n-2w, dry, TD 3,486 ft.

Okmulgee County: Harry L. Wirick et al 1 Buford Miller, SE SW SW 2-15n-13e, dry, TD 1,470 ft.

Osage County: Foundation Oil Co. 1 Osage, NW NE NE 12-23n-3e, dry, TD 4,123 ft.

F. H. Lindsay 1 Osage, NW NE SE 21-23n-7e, dry, TD 2,795 ft.

Pawnee County: Kingwood Oil Co. 1 J. R. Trimble, SW NE SE 27-23n-5e, dry, TD 3,565 ft.

Stephens County: Mack Oil Co. 1 Hoyt, SW SW SE 23-2n-5w, dry, TD 7,143 ft.

An-Son Petroleum Co. 1 Baker, NW NE NW 29-2s-5w, dry, TD 3,811 ft.

Wagoner County: L. B. Hansen et al 1 Jameson, NE NE NE 15-16n-16e, dry, TD 1,470 ft.

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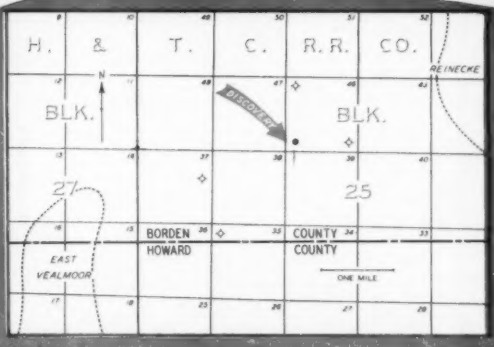
Are you looking for Reefs?

OIL

A Pennsylvanian lime strike in utheastern Borden County was dicated when Lario Oil & Gas o. 1 T. L. Griffin, in 46-25-l&TC, five miles north of Vin-ent, flowed clean 46 gravity oil or about two hours at an esti-mated rate of 20 to 30 barrels hourly on a drillstem test from 7,095-7,110 feet.

Flow was through a half-inch choke. No. 1 Griffin topped the Pennsylvanian reef lime at 7,100 feet. The Lario prospect is be-lived to be on a structure apart from the Reinecke field, two miles east and three-quarters of a mile north.

TULSA WORLD
July 9, 1951



The Client's subsurface expectations were confirmed by SSC's reflection survey.

THE RESULT: A new Pennsylvanian reef discovery in southeastern Borden County, Texas.

Lario Oil & Gas Co. 1 T. L. Griffin, southwest of the Reinecke field and in the southwest corner of Section 46, developed oil on a drill-stem test of the Pennsylvanian reef between 7,095-7,110 ft.

Top of the reef, which had drilled extra soft, was placed at 7,100 ft., on elevation of 2,381 ft. That top was approximately 70 ft. high to dry holes in the northwest and southeast corners of the same section. On the test, gas surfaced in 5 minutes and clean, 46°-gravity oil in 11 minutes. The well made a steady flow of 2 hours, at an estimated rate of 30 bbl. hourly. Operators were to run surveys before setting casing.

OIL and GAS JOURNAL
July 12, 1951

Summarizing SSC's Approach to SUCCESSFUL Reef Exploration, the following fundamental procedures are recommended:

1. Complete Geological and Geophysical Coordination.
2. Detailed Surface and Sub-surface Coverage.
3. Highest Record Quality.
4. Detailed and Thorough Interpretive Technique.
5. Isopach Analyses.
6. Velocity Analyses.

The necessity for detailed seismic surveys and a careful, thorough analysis of all seismic data are emphasized. Also the examination of well samples and electric or radioactive logs often indicates a rapid variation of the sediments in the proximity of organic reefs. Thus, the need is stressed for complete cooperation between geological and geophysical personnel in order to maintain a successful reef exploration program.

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Kansas

Swab Test Yields Oil in Decatur County Wildcat

THE TEXAS CO. recovered 70 bbl. of oil with 125 bbl. of water during a period of 14 hours in starting swabbing tests at its 1 Keenan, NW NW SE 24-5-27, prospective discovery well in Decatur County. Initial test was with casing perforated at 3,478-82 ft. and 3,484-88 ft. in the Lansing-Kansas City lime section, one of three horizons in which promising oil and gas showings were encountered while drilling. The above perforations have been squeezed in an effort to shut off the water and casing will be reperforated in the same zone for further tests.

This well, which may establish the first commercial production for the county, also had showings in the Topeka section, above the Lansing and in the Marmaton, a deeper zone. Tops of these horizons were logged at: Topeka, 3,220 ft.; Lansing, 3,407 ft.; Marmaton, 3,592 ft. Surface elevation is 2,499 ft. Hole is bottomed in granite at 3,894-3,925 ft., and has casing run to 3,800 ft.

Decatur County is on the northern tier of counties, bordering Nebraska, and lies west of the Central Kansas Uplift trend of development.

Alpine Oil & Refining Co. seems fairly certain of making a well in the Lansing-Kansas City lime at its 1 McIlraht, NE NE NW 19-19-12, a wildcat located 1½ miles north of the Fort Zarah pool, about 4 miles east of Great Bend, in Barton County. Plugged back from the Arbuckle, which failed to show, the well has casing perforated in the shallower horizon at 3,208-14 ft. Operators ran swab but the well started to flow and had to be shut in for storage. No estimate of production was made. Top of the Lansing is 3,142 ft. (—1,311 ft.). Top of the Arbuckle was logged at 3,406 ft. Bottom is 3,410 ft.

Another discovery appears to have been made in the same general area by W. L. Hartman, whose 1 Ewalt, SE SE SE 35-19-13, has casing run to test promising oil showings in both the Lansing-Kansas City and Arbuckle. The latter well, 1½ miles east of Great Bend, is about 1½ miles southwest of the Fort Zarah pool. A 30-minute drill-stem test at 3,300-11 ft. in the Lansing-Kansas City topped at 3,175 ft. (—1,342 ft.), got 800 ft. of gas and 40 ft. of oil-cut mud. Three drill-stem tests in the Arbuckle, topped at 3,441 ft., also recovered oil-cut mud with gas showings. Total depth is 3,405 ft. with casing on bottom.

Production of the Southwest Berland pool, Rooks County, is being extended further southwestward where Midstates Oil Co. 1 Teall, NW NW NE 35-10-20, swabbed at an average rate of 2 bbl. of oil per hour while testing Arbuckle at 3,774-79 ft. Pay was treated with 500 gal. of acid.

KANSAS SUCCESSFUL WILDCATS

Ellis County: Isern 1 Krannawitter, SE SW NW 19-12s-17w, 129, bbl., Arbuckle, 3,675-88 ft., TD 3,688 ft.

Pawnee County: Iron 1 Prosser, SW SW SE 36-21s-16w, 4,300,000 cu. ft. of gas, Arbuckle, 3,908-26 ft., TD 3,937 ft. (New pay in Evers pool).

Saline County: Harper 2 Bachofer, CSL NE NE 15-15s-2w, 20 bbl., Mississippi chat, 2,799-2,805 ft., TD 2,805 ft.

KANSAS WILDCAT FAILURES

Barton County: Glickman 1 Gibler, SW SW NW 20-17s-12w, dry, TD 3,480 ft.

Beardmore and Franco Central 1 Streub, SE SW NE 20-18s-11w, dry, TD 3,442 ft.

Branine and Hall 1 Rizha, SW SW SE 34-18s-13w, dry, TD 3,412 ft.

Ash 1-C Musenberg, NE NE NE 16-19s-11w, dry, TD 3,385 ft.

Derby 1 Steckel, NE NE SW 5-20s-12w, dry, TD 3,415 ft.

Mouser 1 Boor, SE SE SW 7-17s-11w, dry, TD 3,403 ft.

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Butler County: Ingling et al 1 Horne, NE NE SW 12-23s-3e, dry, TD 2,827 ft.
Rex and Morris 1 Hill, SW SW SE 30-24s-3e, dry, TD 2,899 ft.
Coffee County: Parker et al 1 Peoples National Bank, SW SW SW 10-22s-15e, dry, TD 1,612 ft.
Dickinson County: Continental Oil Co. 1 Dougan, SW SE NE 20-16s-1e, dry, TD 3,483 ft.
Graham County: Herndon 1 Rodgers, SE SE SW 19-6s-22w, dry, TD 3,993 ft.
Anschutz 1 Houston, NW SW SE 33-9s-11w, dry, TD 3,696 ft.
Kingman County: Wentworth et al 1 McClure, NW NE NW 31-27s-8w, dry, TD 4,543 ft.
Phillips County: Rine 1 McConnell, NW NW SE 36-4s-20w, dry, TD 3,574 ft.
Pottawatomie County: Woods 1 Johnson, NW NW SW 29-8s-12e, dry, TD 3,470 ft.
Pratt County: Lion Oil Co. 1 Howell, NE NE NE 23-29s-15w, dry, TD 4,850 ft.
Trego County: Elliott Davis 1 Christopher, SE SE NE 11-12s-21w, dry, TD 4,066 ft.
Wabumsee County: Adkins et al 1 Schwalm, SW SW NW 8-12s-11e, dry, TD 3,130 ft.

Eastern Texas

Pennsylvanian Oil Show Tested South of Sandusky

DALLAS.—Mid-Continent Petroleum Co. 1 Martin, 1½ miles south of production in the Sandusky field, was showing for production from the Pennsylvanian.

First test from 6,891-98 ft. recovered 5,000 ft. of gas in the drill pipe and 80 ft. of oil-cut mud. A 90-minute test from 6,898-93 ft. has gas in 7 minutes and a hole full of oil at the end of the test period. Bottom-hole flowing pressure reached 975 psi. and 30-minute shut-in pressure was 3,050 psi. Nearest production on that side of the field is in the Ellenburger and the Oil Creek.

New wildcat location for Grayson County was A. J. Hickey 1 B. S. Hackleman, a 7,800-ft. test in the G. W. Cochran Survey, 4 miles east of Whiteboro.

Pure Oil Co. 1 Rufus Howard, northwest of Teague in Freestone County, found gas on its first test of the Travis Peak. The wildcat has shown for production from the Rodessa and the Pettit limestone.

From top of the Travis Peak at 7,636-40 ft., the well flowed gas at the rate of 2,330,000 cu. ft. daily, and recovery was 240 ft. of gas-cut mud. Testing time was 37 minutes. It was coring ahead below 7,740 ft.

Previous shows were in the Pettit at 7,223-7,402 ft., wet gas, and in the Rodessa on two tests between 6,695-6,840 ft.

Second failure for Pine Mills townsite was reported at Hollandsworth Oil Co. 1 Ethel Brogan, S. H. Davis Survey, on the east side of town. Total depth was 6,500 ft. in the Woodbine. Neither that zone nor the sub-Clarksville had oil shows. First failure was on the southwest side of town.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Grayson County: Standard Oil Co. of Texas 1 S. F. McKeon, A. Humes Sur., A-522, 2 mi. NW Sherman field, TD 6,000 ft., elev. 824 ft., pay 5,131-41 ft., IP pumped 67 bbl. 35°-gravity oil a day, GOR 140 cu. ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Cherokee County: A. C. McGahey 1 A. L. Harris, J. Payne Sur., dry, TD 4,505 ft.
Falls County: J. H. Everitt 1 W. J. Walter, Chambers Sur., dry, TD 1,490 ft., Buda 1,451 ft.
Grayson County: K. Kimbell 1 F. J. Reast, Tuttle Sur., A-1,192, dry, TD 8,025 ft.
Marion County: Ryan Consolidated Petroleum Co. 1 R. S. Terry, E. Guest Sur., dry, TD 6,405 ft.
Red River County: Milton Weinberger 1

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MIDLAND, TEXAS

Edmonson Heirs, W. Moore Sur., dry, TD 2,040 ft., Paluxy 981 ft., Glen Rose 1,196 ft.

Robertson County: T. O. Posey 1-A Weber, J. D. Smith Sur., dry, TD 2,885 ft.

Shelby County: Barnwell Drilling Co. 1 M. L. Daw, P. W. Harvey Sur., dry, TD 3,275 ft.

Permian Basin

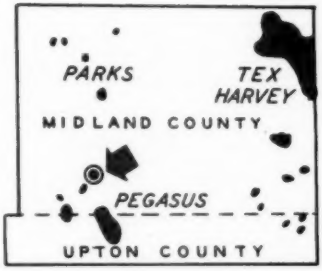
Another Big Ellenburger Discovery in the Making?

MIDLAND. — Sinclair Oil & Gas Co. 3 June Tippett (see map) cored 25 ft. of fractured Ellenburger dolomite from 13,068-93 ft. and prepared to test the section.

This Midland County wildcat topped the Devonian at 12,930 ft. from an elevation of 2,864 ft. A drill-stem test at 12,918-93 ft. developed 165 ft. of free oil and 15 ft. of oil and gas-cut drilling mud. After coring an additional 50 ft. in two stages, a drill-stem test at 12,993-13,043 ft. yielded 1,960 ft. of clean oil and 180 ft. of oil-cut drilling mud.

To the southwest, Sinclair 1-A June Tippett, Devonian prospect northwest of Pegasus and east of Sweetie Peck field, swabbed and flowed 103 bbl. of oil with no water from Devonian perforations at 12,250-305 ft. The well is an east offset to C. W. Murchison 1 Joe Cannon, Pennsylvanian extension well.

Sinclair 1 Dickenson, Martin County wildcat, has failed in both the upper and lower Spraberry sands but is to be drilled ahead to the Ellenburger, or to 11,000 ft. Sinclair's test is 3½ miles northeast of Tide Water's Ellenburger discovery, recently completed.



Arrow points to Sinclair 3 Tippett.

Sinclair 1-A Harry Lester had casing set to top of the Spraberry and was to drill plug and Hydrafrac in open hole.

In east-central Martin County, Argo Oil Corp. 1 Brown had casing set at 7,483 ft., 6 ft. off bottom and 1 ft. into the Spraberry.

Blackwood & Nichols 1 Stimson & Burley recovered oil and gas-cut mud, plus some salt water, on a drill-stem test in the lower Pennsylvanian from 10,804-895 ft.

Northeast of Lenorah, Deep Rock Oil Corp. 1 Woodworth prepared to core ahead at 7,840 ft. in sand and shale.

In west-central Howard County, Deep Rock Oil Corp. 1 McCary topped the Pennsylvanian reef at 8,888 ft., and minus 6,244 ft., which was about flat with the Burton Pennsylvanian discovery some 4 miles to the northwest.

Deep Rock's test recovered slightly gas-cut mud on drill-stem test from 8,893-8,912 ft., then recovered 448 ft. of the same on a 40-minute test from 8,910-65 ft. Drilling continued below 9,018 ft.

James H. Snowden and others 1 O. L.

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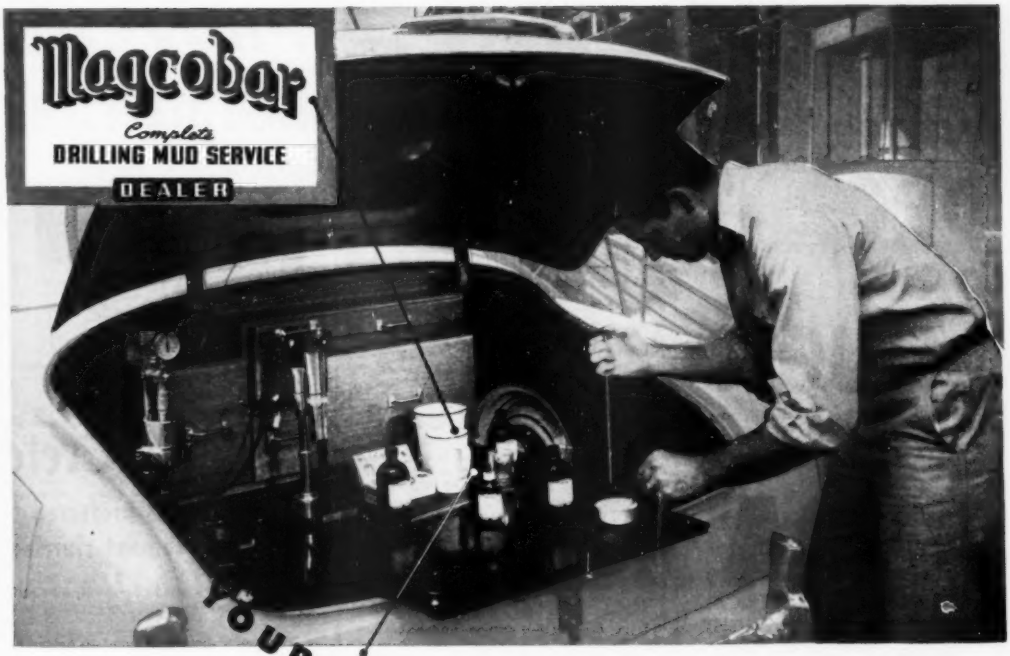

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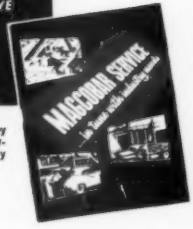

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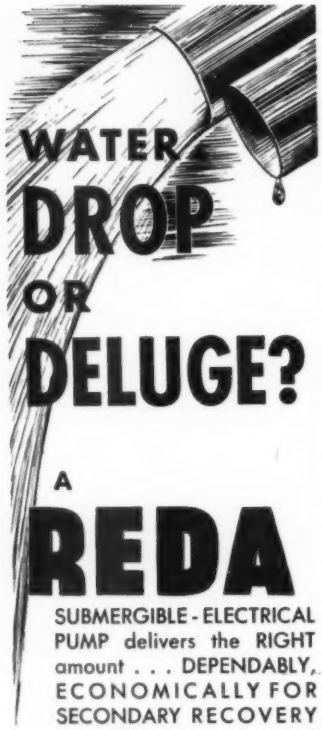

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•

BARTLESVILLE, OKLAHOMA

Greer, Spraberry discovery in northwestern Reagan County, completed on the pump for approximately 30 bbl. of oil, plus some water. Production was from open hole between 6,057-6,130 ft., total depth. Location is 7½ miles northeast of the Weddell-Spraberry area, and 4½ miles west of Stanolind Oil & Gas Co. 1 Wade which recently completed as a small pumper.

Pennsylvanian oil has been found at Richardson & Bass 1 J. F. McCabe, in southeast Mitchell County and some 5 miles north of the Jameson-Pennsylvanian field of Coke County. The well topped the Cisco at 6,046 ft. and ran a 2-hour test at 6,035-65 ft. Oil came to the surface in 72 minutes, at an estimated 5 bbl. an hour. Recovery in the pipe was 270 ft. of oil and 170 ft. of oil and gas-cut mud. It was coring ahead at 6,107 ft. in shale with no shows. The project was started as an Ellenburger exploration.

South of Colorado City, S. F. Hurlbut 1 Winn topped the Ellenburger at 7,440 ft. and developed oil or oil-cut mud on three drill-stem tests. First test at 7,450-77 ft. had 30 ft. of free oil. From 7,447-87 ft. recovery was 20 ft. of oil and 70 ft. of oil and gas-cut mud. Last reported test at 7,487-7,507 ft. had 120 ft. of oil, 220 ft. of heavily oil and gas-cut mud and 30 ft. of sulfur water.

A deeper pay, thought to be Strawn of the Pennsylvanian, has been found right in the middle of the 26-year old World field of north Crockett County. The discovery is 1-E Powell, a joint operation by Continental Oil Co. and Humble Oil & Refining Co., and was originally projected to the Ellenburger, or around 11,000 ft.

On elevation of 2,757 ft. the 1-E Powell topped the limestone at 8,087 ft. First test from 8,087-8,108 ft. had gas in 6 minutes and clean oil in 75 minutes. It flowed 24 bbl. of oil in 45 minutes under bottom-hole pressure that climbed to 650 psi. Shut-in pressure was 3,025 psi. in 15 minutes. Recovery in the pipe was 1,560 ft. of oil only slightly cut with gas and mud, and no water. It was to drill ahead.

Production in World field is from the Grayburg section of the Whitehorse group, from 2,550-2,650 ft. The 1-E Powell is the first test in the field proper to go below the San Andres, which lies just below the Grayburg.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crockett County: C. E. Marsh 1-A University Lands, TD 1,753 ft., elev. 2,696 ft., San Andres pay 1,729 ft., IP pumped 47 bbl. 30°-gravity oil a day.

Martin County: Tide Water Associated Oil Co. 1 E. B. Dickenson, 37-1N-T&P, TD 12,136 ft., elev. 2,746 ft., Ellenburger 12,090 ft., pay 12,087-119 ft., IP flowed 235 bbl. 51°-gravity oil a day, TP 150 psi., GOR 567 cu. ft.

Runnels County: Cabot Carbon Co. et al 1 T. Frick, 78-A706-T&P, TD 4,766 ft., Palo Pinto 3,812 ft., perforated 3,831-32 ft., IP pumped 30 bbl. 42°-gravity oil.

Schleicher County: Wesley West 1 Christena Mittel, 77-TT-TCRR, TD 6,372 ft., elev. 2,321 ft., Strawn 6,008 ft., pay 6,090 ft., IP flowed 583 bbl. 45°-gravity oil a day, 18/64-in. choke, TP 780 psi., GOR 849 cu. ft.

Upton County: Sohio Petroleum Co. 1 Ralph W. Clark, 11-N-HE&WT, TD 7,191 ft., elev. 2,745 ft., Spraberry (?) pay 7,155 ft., IP flowed 145 bbl. 37°-gravity oil a day, ¾-in. choke, TP 80 psi., GOR 784 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C)

Andrews County: Buffalo Oil Co. 1 David Fasken 2-C, 30-41-2n-G&MMB&A., dry, TD 4,957 ft., elev. 3,025 ft., Grayburg 4,620 ft.

Coke County: Hickok & Reynolds, Inc. 1 W. H. Rogers, 431-1-A-H&TC, dry, TD 5,396 ft.

Union Oil Co. of California 1-B Whiteside Estate, 268-1-A-H&TC, dry, TD 5,732 ft.

Concho County: Ralph O. Brown 1 H. L. Mosley, H&TC Sur., dry, TD 3,270 ft., Ellenburger 3,026 ft.

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Crockett County: Gulf Oil Corp. 1 Ed Bean, 67-OP-GC&SF, dry, TD 8,045 ft., elev. 2,574 ft., Pennsylvanian 7,895 ft., Ellenburger 7,945 ft.

Neville G. Penrose 1-A University, 7-30-University Lands, dry, TD 1,713 ft., elev. 2,651 ft., San Andres 1,692 ft.

Howard County: Fullerton Oil Co. 1 Collins Ranch, 42-31-3N-T&P, dry, TD 8,350 ft., elev. 2,605 ft., Dean 7,050 ft., Canyon reef 8,025 ft.

Kent County: C. T. McLaughlin 2 Elkins, 2-5-H&GN, dry, TD 2,340 ft.

Lubbock County: Standard Oil Co. of Texas 1 Flynn, 10-D-L&SU, dry, TD 11,171 ft., elev. 3,359 ft., Strawn 9,810 ft., Mississippian 10,923 ft., Mississippian dolomite 11,095 ft.

Menard County: Furney & Polk 1-A W. W. Russell, Sec. 30, W. D. Dodd Sur., dry, TD 2,291 ft.

Mitchell County: S. F. Hurlbut 1-A W. E. Ellwood, 2-16-SPRR, dry, TD 7,429 ft., elev. 2,027 ft., Mississippian 7,280 ft., Ellenburger 7,350 ft.

Pecos County: Penntex Oil Co. et al 1 Clayton Williams, 1-117-GC&SF, dry, TD 4,713 ft., elev. 3,011 ft., Rustler 1,350 ft., Yates 2,638 ft.

Reagan County: Blackwood & Nichols 1 D. E. Hughes, Sec. 22, W. M. Cleveland Sur. 22, dry, TD 10,640 ft., elev. 2,632 ft., Spraberry 5,770 ft., Pennsylvasian 9,546 ft., Ellenburger 10,510 ft.

Runnels County: Mid-Continent Petroleum Corp. 2 B. R. Thetford, Wharton CSL, A-499, dry, TD 4,080 ft.

Schleicher County: Delta-Gulf 1 F. B. Spence, 3-M-GH&SA, dry, TD 6,510 ft., elev. 2,296 ft., Palo Pinto 4,725 ft., Ellenburger 6,335 ft.

Sterling County: W. F. Stricklin 1 A. A. Gunter, 25-22-H&TC, dry, TD 1,890 ft.

Upton County: Blackwood & Nichols Co. 1 Humble-Eager, Sec. 1, Indianola RR Sur., dry, TD 7,790 ft., elev. 2,703 ft., Spraberry 6,771 ft.

Yoakum County: Continental Oil Co. 1 M. S. Pierson, 16-L-PSL, dry, TD 12,335 ft., elev. 3,826 ft., Pennsylvanian 9,370 ft., Mississippian 11,530 ft., Devonian 12,184 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Hall County: Amerada Petroleum Corp. 1 Hughes, 101-S5-D&P, 9 mi. E Turkey, dry, TD 8,121 ft., elev. 2,095 ft., pre-Cambrian 8,108 ft.

SOUTHEAST NEW MEXICO

HOBBS.—Phillips Petroleum Co. 1 Fort, prospective Devonian extension to the Denton field, developed salt water on a test from 12,770-12,804 ft. and was taking electrical surveys before runing casing. Previous 2-hour test at 12,632-12,770 ft. recovered 10 bbl. of oil and 70 bbl. of heavily oil and gas-cut mud. The well had 188 ft. of pay indicated.

The Texas Co. 1-AT State, central Lea County wildcat, was coring ahead after a 3-hour test from 9,740-9,805 ft. recovered 92 ft. of slightly oil and gas-cut mud, 305 ft. of oil and gas-cut sulfur water and 4,350 ft. of sulfur water.

Skelly Oil Co. will drill a west offset to its Ellenburger discovery west of the Dollar Hide area of Andrews County. The second well is the 2-J Mexico-State in SW SE 32-24s-38e. Contract depth was 11,000 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCATS

Eddy County: Olen Featherstone 4 State, 18-19s-28e, TD 2,733 ft., elev. 3,521 ft., pay 1,880 ft., IP flowed 8 bbl. oil a day.

Lea County: The Texas Co. 1 State AS, 6-15s-32e, TD 9,802 ft., PB 9,727 ft., elev. 4,325 ft., perforated 9,700-26 ft., IP flowed 1,408 bbl. 41°-gravity oil a day, ½-in. choke, TP 200 psi., GOR 593 cu. ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Magnolia Petroleum Co. 1 Four Lake Unit, 15-10s-34e, dry, TD 13,144 ft., elev. 4,325 ft., Permo-Pennsylvanian 9,055 ft., Mississippian 12,300 ft., Devonian 13,126 ft.

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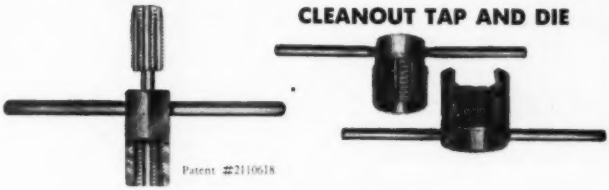

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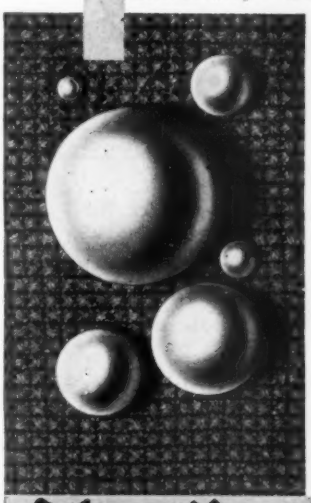

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South Louisiana

New Grosse Tete Field Confirmed by Sohio Well

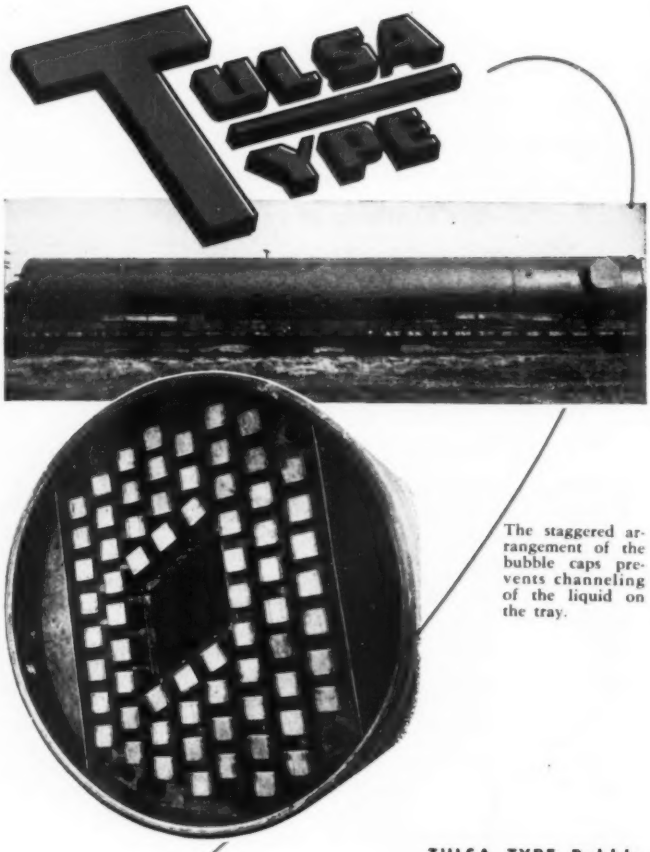
NEW ORLEANS. — Production has been confirmed in the new Grosse Tete field, West Baton Rouge Parish, at Sohio Petroleum Co. 2-A. Wilbert and Sons "B," which also opened a new pay for the field. Through perforations at 9,696-9,705 ft., the well is credited with a flow of 1,980,000 cu. ft. of gas daily plus 56 bbl. of condensate. Gage was made through 16/64-in. tubing choke with tubing pressure at 1,350 psi.

The discovery well for Grosse Tete field was completed for 53 bbl. of 53.1°-gravity condensate daily through perforations at 10,030-36 ft. Sohio is rigging up for a third test in the area, 1 M. L. Lipscomb, et al, 18-8s-11e.

Shell Oil Co. has completed its Terrebonne Parish wildcat, 1 State Lease 1799, in Block 23, for a gasser. Completion was made through perforations at 2,657-62 ft. after drilling the well to total depth of 14,000 ft. and plugging back. The well flowed 1,432,000 cu. ft. of gas daily through 16/64-in. choke with 1,600 psi. pressure on the tubing. Operator tested salt water from lower zones between 11,000 and 12,000 ft.

Sinclair Oil & Gas Co. is drilling below 11,970 ft. at 1 Turner Lumber Co., 29-2s-6e, Avoyelles Parish wildcat. This well indicated gas-distillate and/or oil production from the Wilcox zone. A 45½-ft. sand section was cored at 11,724-69½ ft. which indicated gas and condensate production. Another sand section was cored from 11,811-29½ ft. which indicated gas condensate and possible oil production. Location is 21 miles east-southeast of Eola field, which produces from the Wilcox at 8,500 ft.

Sohio is preparing to abandon 1 Slaughter-Christian, wildcat east of Sunshine field, Iberville Parish, after drilling to 10,589 ft. with no shows reported. Electrical surveys were run to tal depth.



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TULSA, OKLAHOMA

Texas Gulf Coast

Boling Field Extensioner Potentials 101 Bbl. Daily

HOUSTON.—Potential test has been run on an extension to Boling field, Fort Bend County, which was completed as one of the largest oil wells in the area. Henderson Drilling Co., et al, 2 R. G. Pleasants, et al, flowed 101 bbl. of oil daily through ⅛-in. choke. Production is through casing perforations at 3,795-3,807 ft. Hole is bottomed at 3,810 ft. with pipe landed at that depth. Location is in D. W. Anthony League.

Gulf Oil Corp. has run production casing in 1 Sophie Brown, et al, Victoria County wildcat located 3 miles southeast of Helen Gohlke-West Fordtran field. The venture is bottomed at 9,260 ft. with casing set at 8,800 ft. Production tests will be run opposite gas show cored at 9,011-16 ft. This well is located in J. B. Kibbe Survey 14, Indianola Railroad Survey, Abstract 426.

Gas production has been extended on the southwest flank of Heard Ranch field, Bee County, at Heep Oil Corp. B-1 Claude E. Heard. Through perforations at 4,274-80 ft., the well flowed 25,000,000 cu. ft. of gas daily on open-flow gage.

A Karnes County wildcat, Horrigan and Fohs 1 Mary Pargmann, is being completed in the Luling sand for a gas-distillate discovery. Through perforations at 7,158-78 ft., flow was estimated at 30,000,000 cu. ft. of gas daily plus 30 bbl. of distillate per million cubic feet. The well is located southeast of Runge field.

A possible new oil discovery is indicated for Goliad County at Kirkwood & Co., et al, 1 William Hoff, Peter B. Dexter Survey, Abstract 319. Drill-stem test of perforations at 9,003-18 ft. recovered 210 ft. of oil and 30 ft. of oil-cut mud. Working pressure was 8½ psi., and bottom-hole flowing pressure was 480 psi. Minor gas shows had been logged in the wildcat from 3,866-9,028 ft. Operators are now coring below 9,028 ft.

Rankin field production has been extended to the north with completion of the fifth producer for the field. S. A. Brewster and W. O. Bartle, et al, have completed 1 Wilda L. Scott in Harris County for 82 bbl. of oil daily through a 9/64-in. choke. Tubing pressure was 450 psi., casing sealed. Gravity of the oil was 36.9°. Production is through perforations at 7,926-28 ft. Top of the pay was encountered at 7,896 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Colorado County: Oil discovery—Ohio Oil Co. 1 W. K. Lehrer, et al, Nahan Mixon Sur., A-402, TD 9,946 ft., perf. 6,180-90 ft., IP: 23 bbl. oil per day on pump, 36.4° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Fort Bend County: Quintana Petroleum Corp. 1 A. P. George, Robert Peebles Sur., A-67, dry, TD 8,215 ft.

Goliad County: Continental Oil Co. 1 Emma Haynes, H. T. Callihan Sur., A-80, dry, TD 8,002 ft.

Horace Coon, Jr., et al, 1 S. G. Sample, Sylvester Bowen Sur., A-8, dry, TD 5,386 ft.

Grimes County: Placid Oil Co. 1 Herbert Youens, J. B. McNealy Sur., 1½ mi. NE of Navasota, dry, TD 9,314 ft.

North Central Texas

Nolan County Pennsylvanian Prospect Tests Flowing Oil

WICHITA FALLS.—Seaboard Oil Co. 1 Hanks, Nolan County Pennsylvanian prospect northeast of Blackwood, developed flowing oil on first test of a reef section at 4,584-4,609 ft. but encountered sulfur water on a second test from 4,607-34 ft. Operators believed the well had a possible 25-30 ft. pay section. It was drilled ahead to 4,777 ft. and tested between 4,752-77 ft. where it recovered over 3,000 ft. of salt water in 1½ hours. It was drilling ahead.

In Fisher County, General Crude Oil Co. 1 Dix, northwest of Hamlin, developed salt water on a test from 4,434-44 ft. and salty mud on test from 4,513-25 ft.

Elm Oil Co. 1 Ira Williams, Jack County wildcat 4 miles southeast of Jermyn, was dry at 4,817 ft. The well had a possible 6-8 ft. of pay between 4,803-17 ft., where it developed gas at the rate of 650,000 cu. ft. daily and recovered some 10 ft. of 49°-gravity oil.

F. Kirk Johnson 1 Henderson Welch, wildcat 3 miles east of Jermyn, was dry at 5,580 ft.

Warren Oil Corp. 1 Williams, Caddo and Mississippian discovery southeast of Woodson, reported completion test from the lower pay. Potential was 734 bbl. of 42°-gravity oil a day through 20/64-in. choke from open hole at 4,367-78 ft.

Skelly Oil Co. 1 G. F. Stubbs, discovery or extension to the North Knox City field of Knox County, completed as a flowing well from the Canyon reef at 4,165-4,289 ft. Potential was 120 bbl. of oil in 4 hours through 24/64-in. choke, for a daily rate of 720 bbl.

In Haskell County A. G. Hill and others 1 A. H. Wair, ½-mile north stepout to the Sojourner field, had missed the field's regular pay around 5,200 ft. but had prospects of production from other sections. Sections to be tested, which had developed oil on drill-stem tests, were from 4,753-75 and 4,615-44 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Callahan County: Mid-Continent Petroleum Co. 1-A Blan Odom, W. E. Pledger Sur., 12 mi. SE Baird, TD 4,177 ft., elev. 1,829 ft., Ellenburger 4,170 ft., IP flowed 159 bbl. 42°-gravity oil a day, 15/64-in. choke, TP 760 psi., GOR 2,295 cu. ft.

Jones County: Hooker & DeMohrenschildt 1 W. A. Minter, Jr., 26-15-T&P, TD 2,041 ft., pay 2,032 ft., IP pumped 50.6 bbl. 39°-gravity oil a day.

Shackelford County: J. G. McMillian et al 1 G. R. Davis, 6-13-T&P, TD 1,644 ft., elev. 1,749 ft., Bluff Creek 1,633 ft., perforated 1,624-42 ft., IP pumped 168 bbl. 39.5°-gravity oil a day.

Stephens County: Husky Oil Co. 1 W. H. Corbett, Sec. 1,057, TE&L Sur., TD 4,680 ft., Caddo 3,235 ft., gas pay 4,011 ft., IP flowed 4,000,000 cu. ft. gas a day, ¾-in. choke, TP 920 psi.

Young County: R. H. Siegfried Co. 1 Allar Co., TE&L Sur. 3,410, 5 mi. E Murray, TD 3,539 ft., pay 3,492 ft., IP flowed 112 bbl. 42°-gravity oil a day, 21/64-in. choke, TP 320 psi., GOR 547 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

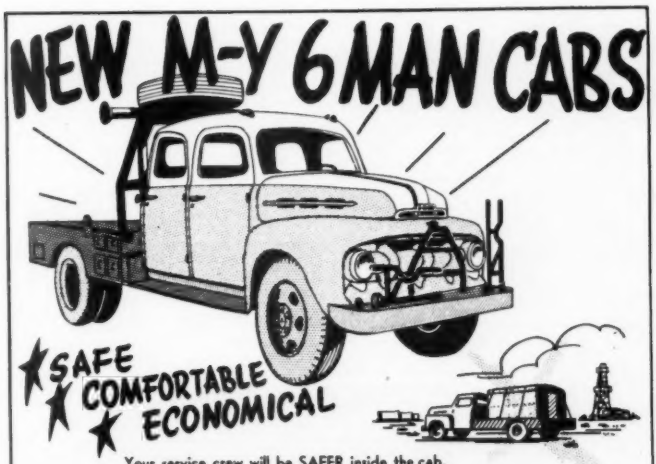
Archer County: C. W. and Wm. L. Snoddy 1 Phillips, Standerford Sur., A-334, dry, TD 1,255 ft.

Cooke County: John F. Camp & Sons 1 H. G. Perry, J. Spear Sur., A-915, dry, TD 4,206 ft.

The Texas Co. 1-B Meador, Henry Dickson Sur., A-335, dry, TD 4,029 ft., in pre-Cambrian.

Fisher County: W. M. Fuller 1 Ted Marchant, 11-21-T&P, dry, TD 6,276 ft., elev. 2,135 ft., Cisco 3,601 ft., Swastika 4,036 ft.

Foard County: Schwab, Witherspoon & So-



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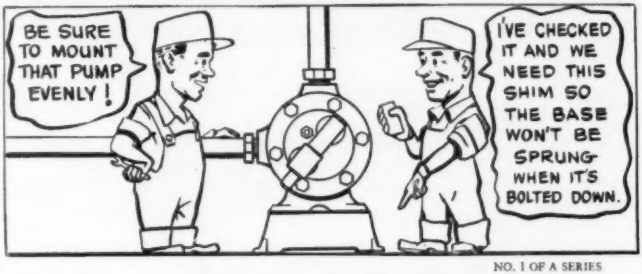

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journer 1 G. G. Crews, 311-A-H&TC, dry, TD 5,005 ft.

Haskell County: Lewis & Mucher 1 J. J. Oates, 26-74-Red River CSL, dry, TD 5,800 ft.

Jack County: Jack Grace 1 G. Gresham, A. Herring Sur., A-282, dry, TD 3,720 ft. Roeser & Pendleton, Inc. et al 1 H. L. Allen, J. Bloodworth Sur., A-67, dry, TD 5,103 ft., Caddo 4,398 ft.

Jones County: E. K. & E. M. Burt 1 E. D. Shanafelt, 31-1-BBB&C, dry, TD 3,858 ft., elev. 1,636 ft., Gunsight 2,766 ft.

W. F. Palmer 1 D. W. Rogers, 6-5-M. Lawson Sur., dry, TD 3,000 ft., Flippen 1,830 ft., upper Hope 1,990 ft.

Woodley Petroleum Co. 1 N. A. Bagley, 18-15-T&P, dry, TD 5,129 ft., Caddo 5,093 ft.

Palo Pinto County: C. C. Grantham 1 W. A. Gregg, Suzie Latham Heirs Sur., A-281, dry, TD 3,210 ft.

Harry Kithas 1 Paul Stephen, W. W. Cochran Sur., dry, TD 1,331 ft.

H. D. Latimer and J. M. Baer 1 Telchick, 60-3-T&P, dry, TD 1,402 ft.

Transgulf Corp. 1 J. T. McClure-Stanolind, 1,728-A503-TE&L, dry, TD 4,928 ft., elev. 1,105 ft., Barnett 4,650 ft., Ellenburger 4,831 ft.

Zenith Petroleum Corp. 1 H. C. Gilmore, Geo. Dedrick Sur., A-154, dry, TD 2,605 ft.

Shackelford County: Hunter, Briscoe & Smith 1 J. W. Mims, 62-14-T&P, dry, TD 1,724 ft.

Stephens County: C. A. Hurst 1 M. C. Graham, 81-4-T&P, dry, TD 1,817 ft.

Stroube-Palo Pinto Co. 1 Lee Aguirre, 47-4-T&P, dry, TD 2,192 ft.

Stonewall County: G. E. Kadane & Sons 1 Oscar Peacock, 205-D-H&TC, dry, TD 6,710 ft., elev. 1,766 ft., Caddo 6,153 ft., Mississippian 6,448 ft., Ellenburger 6,528 ft.

W. B. Trammell 1 Fay Young Morton, Blk. 26, Austin & Williams Sur., dry, TD 6,550 ft., elev. 1,797 ft., Strawn 5,344 ft.

Taylor County: Geochemical Surveys, Inc. 1 C. Haynes, 26-124-Grimes CSL, dry, TD 3,047 ft.

D. F. O'Rourke 1 Frank Brnovak, 70-19-T&P, dry, TD 5,613 ft., elev. 2,240 ft., Swastika 3,655 ft., Fry 5,365 ft., Gardner 5,510 ft., Capps 5,270 ft.

Wichita County: Reno Oil Co. 1 P. G. Krohn, 11-A147-H&GN, dry, TD 3,824 ft.

Wise County: Mid-Continent Petroleum Corp. 1 E. E. Norton, C. Frazier Sur., A-298, dry, TD 6,000 ft., Caddo 4,600 ft.

Young County: Champlin Refining Co. 1 Loftin, J. Bennet Sur., A-1,577, dry, TD 4,861 ft., Caddo 4,254-4,396 ft.

Rankin & Pitcock et al 1 Sowers-Allar Co., TE&L Sur. 437, dry, TD 4,815 ft., elev. 1,051 ft., Mississippian 4,765 ft.

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Canadian Fields

Reef Strike Made Southwest Duhamel Area

CALGARY.—This week Canadian Superior Oil of California, Ltd., made its first Devonian reef oil discovery in Canada at a venture in the New Norway area of central Alberta. In the Caprona area of south central Alberta, where Canadian Gulf Oil Co. last week discovered Devonian oil, a thicker pay zone has been encountered, to further warm up the prospects for that discovery. While in the Wizard Lake area southwest of Leduc, the Texaco Exploration Co. and McColl-Frontenac Oil Co. team found a D3 Devonian oil reef 374 ft. in thickness and had not as yet encountered water.

Canadian Superior's strike was made at its 15-36 Holt wildcat located in LSD 15, 36-44-22w4, about 125 miles north-northeast of Calgary. Appearances are that this well could be a discovery of major importance for that region, as the hole has to date found 77 ft. of D2 oil productive zone without encountering water. The well is now bottomed at 4,661 ft., and crew is continuing to core and test. After fully penetrating the D2 section, crew will take the well in search of D3 reef.

The 15-36 Holt venture at New Norway is located about 16 miles southeast of Wetaskiwin and that same distance southwest of Camrose. It is situated some 2¾ miles southwest of the Duhamel-Devonian oil area, and is separated from that pool by a dry hole.

Canadian Gulf's Caprona oil discovery, located in LSD 10, 23-36-20w4, is Gulf-Gough 10, around 90 miles northeast of Calgary, and about midway between the 16-mile stretch separating the Big Valley and Stettler oil fields. Since last week when the discovery was chalked up, 10 Gough has penetrated 70 ft. of D2 oil pay to 5,244 ft., and is continuing down in search of the water line preliminary to drilling for D3. It appears that the discovery well may have as much or more D2 pay zone than the Stettler wells to the north. The Caprona strike is Gulf's third Devonian discovery in the Big Valley-Stettler area. A Lower Cretaceous strike was also made by Gulf about 2 miles east of this new Devonian oil discovery.

Texaco-McColl's ¼ mile south offset to the Wizard Lake discovery has now rated about 375 ft. of D3 oil pay thickness, and has not as yet shown any formation water during drill-stem tests. That well has the largest pay zone of any Alberta field with the exception of the famed Golden Spike field that rated zones up to 600 ft. in thickness. The prospects for a major discovery at Wizard are brightening. The follow-up venture, with the prolific D3 reef, is Texaco-Wizard Lake B-2, in LSD 5, 22-48-27w4, about 5 miles southwest of the Leduc oil field. Hole is bottomed at 6,394 ft., and crew is running a further test. If at that depth, the well should not have found D3 water, it will have opened a total of 400 ft. of productive horizon.

Wizard Lake is a tri-zone oil discovery.

having found oil in the Lower Cretaceous, D2 and D3 zones of Devonian. It also chalked up discovery of natural gas in the shallower Viking sand formation. The discovery well went on production from D3 after penetrating only 11 ft. in that horizon.

Canadian Delhi Oil, Ltd., has found natural gas at another pair of drillers in Alberta, one in the southern sector of the province and the other in central Alberta. In the Cessford area of southern Alberta, where Delhi has been carrying out an extensive exploratory and development program, Canadian Delhi-Cessford 9 well rated natural gas flows of over 5½ million cubic feet daily. The well is located in LSD 3, 30-25-12w4, about 5 miles from previous gas wells in that area. Latest drill-stem test, from 3,289-3,300 ft., gave gas to surface in 2 minutes, at rate of 5,600,000 cu. ft. daily.

In the Picardville area, Canadian Delhi-Picardville 3 well, located in LSD 11, 4-59-26w4, is completed in the Viking sand as a natural gas well. An 80-minute test at 2,731-90 ft., gave a natural-gas flow rate with maximum 2,680,000 cu. ft. daily.

Southwest Texas

Starr County Gas Discovery Gages 42,500 M.c.f. Per Day

CORPUS CHRISTI.—Sunray Oil Corp. 1 G. G. Zamora, wildcat discovery in Starr County, has been gaged for 42,500,000 cu. ft. of gas daily with 10 to 15 bbl. of distillate per million cubic feet. Production is from the Sullivan sand at 4,366-79 ft. Shut-in pressure was 1,716 psi. Core from 4,365-75 ft. had gas odor, as well as did a core from 4,375-85 ft. Hole is bottomed at 6,600 ft. with casing set at that depth. Tests were made of the 6,200-ft. level, with recovery being water.

A Zapata County wildcat is running pipe to test gas-pay indications around 2,700 ft. Gorman and Delange, et al, 1 San Juan Ramirez, H&GN Survey 7, Share 5, is bottomed at 6,080 ft. and earlier drill-stem test at 5,801-11 ft. recovered mud. Another test at 5,811-21 ft. made slight blow with recovery being 32 ft. of mud.

Buchanan field, Caldwell County, has been extended ½ mile to the northwest at Riddle Oil Co. 4 A. J. Miears. The well was completed from open hole at 1,980-81 ft. subsequent to acidizing with 2,000 gal. for 44 bbl. of 39°-gravity oil daily on pump. Location is in Nick Kelly Survey.

Hiawatha Oil & Gas Co. have staked location for a 13,000-ft. deep test in Benavides field, Duval County. The venture is 34 George Parr.

An extension to North Fitzsimmons field, Duval County, has been completed at Falley & Gilmour, et al, B-1 Christian Soliz. The well flowed 70 bbl. of oil daily through 7/64-in. choke with 700 psi. tubing pressure. Production is through perforations at 4,457-61 ft. Location is in J. Poitevent Survey 143, Abstract 388.

The Superior Oil Co. 27 Minnie S. Welder, drilling-depth record holder for Texas, is bottomed at 17,691 ft., and operator is now circulating to bypass fish. This test is located in Portilla field, San Patricio County.

Another deep South Texas well in Hidalgo County is fishing for drill-pipe at 11,729 ft. Magnolia Petroleum Co. 1 Grace Doughty, Linn area wildcat, was drilled to 12,593 ft. Electric log was run to bottom and operator was going back in the hole with drill pipe when it became stuck.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Hidalgo County: New pay at Los Torritos—Taylor Refining Co. & Mayfair Minerals, Inc., 1 William Brewster, Los Torritos Grant, TD 9,496 ft., perf. 6,746-51 ft., IP: 12,000,000 cu. ft. of gas daily.

Nueces County: New pay at Red Fish Bay—Atlantic Refining Co. 1 State Tract 413, located in Corpus Christi Bay, State Tract 413, TD 8,400 ft., perf. 7,950-60 ft., IP: 108 bbl. oil per day, ⅛-in. choke, 39.6° gravity.

Starr County: Gas discovery—Sun Oil Co. 1 Hinojosa, Santa Cruz Grant, TD 4,939 ft., perf. 6,133-45 ft., IP: 11,000,000 cu. ft. of gas daily open flow.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Sun Oil Co. 1 St. Charles Bay State Tract 387, St. Charles Bay, Tract 387, dry, TD 10,522 ft.

Bastrop County: John H. Foster 2 Bessie Grohmann, J. A. Navarro Sur., dry, TD 2,106 ft.

H. C. Thorman 1 Wilhelm, N. W. Eastland Sur., A-156, dry, TD 4,108 ft.

Bexar County: F. H. Eckert & Son 1 John Gembler, A. Manchaca Sur., dry, TD 659 ft.

Duval County: Dunlap & Coring 1 Clara Driscoll Estate, Stephen Gray Sur., dry, TD 4,255 ft.

McCarrick Oil Co. 1 H. J. & Frank J. Gravis, Sur. 88, A-1649, dry, TD 6,125 ft.

Jim Hogg County: Delhi Oil Corp. 1 Adolpho Trevino, El Peyote Grant, dry, TD 3,207 ft.

Humble Oil & Refining Co. C-1 E. B. Atwood, AB&M Sur. 119, A-25, dry, TD 3,146 ft.

Paisano Rrading Co., Ltd., 2 Guiterrez, Sur. 142, 1½ mi. NE of Ed Lasater field, dry, TD 2,796 ft.

Jim Wells County: W. Earl Rowe A-1 R. V. Embleton, Los Presenos de Arriba Grant, dry, TD 3,556 ft.

San Patricio County: Lonnie Glasscock 1 R. B. McGloin, John McMullin Grant, A-17, dry, TD 6,500 ft.

Starr County: C. P. Burton 1 H. P. Guerra, Sur. 296, 16 mi. NE of El Sauz, dry, TD 4,816 ft.

Webb County: Charles Daubert 1 Bruni

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Estate, Brown Subd. of Albercas Grant, Block 12, dry, TD 1,826 ft.

O. W. Killam 1 Russell & Winch, Sur. 2,135, 19 mi. N-NE of Aguilares, dry, TD 3,575 ft.

Williamson County: M. J. Simmons 1 Annie Pfluger Estate, W. F. Parker Sur. 102, dry, TD 1,000 ft.

Wilson County: Martin, Shelly, Thomas & Texita 1 A. M. Smith, A. M. Highsmith Sur. 359, A-153, dry, TD 5,219 ft.

Mississippi

Wilcox Discovery in Franklin County Finaled

JACKSON.—Final completion has been made at Sun Oil Co. 1 J. D. Seab, 45-6n-1e, Franklin County. The well was completed to pump and flow 96 bbl. of oil per day through ¼-in. choke from the Wilcox at 6,423-26 ft.

Meanwhile, Sun is drilling below 5,800 ft. at 1 Jim Shell, 33-6n-1e, located approximately ½ mile northeast of 1 Seab.

One mile south, the discovery well for South White Apple field, Gammill-Cashion 1 Anderson, 3-5n-1e, has installed pump and is nearing completion. On the first 24-hour test, the well pumped and flowed 89 bbl. of net oil through 10/64-in. choke. Tubing pressure was reported to be 350 psi. Production is from the Wilcox at 6,265½-66½ ft.

In southeastern Pike County, Humble Oil & Refining Co. is reported to have set 7-in. casing to 11,297 ft. in 1 Bill Fortenberry, rank wildcat in 27-2n-9e. Although no detailed information has been released, it is reported that a show of oil was encountered at 11,171-79 ft. in the Lower Tuscaloosa and also that two attempts to drill-stem test this zone were unsatisfactory. Hole is bottomed at 12,000 ft. This well is approximately 26 miles west of production at Hub field, and the area is usually considered to be somewhat down-dip for very good Lower Tuscaloosa sand development.

Continental Oil Co. has announced location for a northwest offset to the discovery well at Virlillia field, Madison County. The venture is 2 Cameron, and is projected to top of Cotton Valley. The discovery well, 1 Cameron, was completed from the Hosston sand and gravel at 10,559-63 ft.

Alabama.—Alabama's Escambia County wildcat, Stanolind Oil & Gas Co. 1 F. A. Steward, which had shows of oil in the Lower Tuscaloosa, is now shut down waiting on orders to either set casing or abandon. Cores, core analysis, and drill-stem test indicate that it might be possible to complete a small producer from the top 4 ft. of Lower Tuscaloosa sand at 5,928-42 ft.

Florida.—Florida's only active well, Humble Oil & Refining Co. 1 Collier Corp., 27-50s-26e, Collier County, has been abandoned at total depth of 12,600 ft. There were no details or tops released on the wildcat.

MISSISSIPPI SUCCESSFUL WILDCAT

Franklin County: Oil discovery—Sun Oil Co. 1 J. D. Seab, 45-6n-1e, TD 7,004 ft., Wilcox 6,423-26 ft., IP: 96 bbl. oil per day, flowing and pumping, TP 50 psi., 37.3° gravity.

MISSISSIPPI WILDCAT FAILURES

Adams County: Dorris Ballew-Gulmon & Johns 1 Laura Butler, 15-5n-3w, dry, TD 6,848 ft.

Lamar County: H. G. Lewis, Jr.-Chas. Roseberry, Jr., 1 J. M. Voss, et al, 5-2n-14w, dry, TD 9,010 ft.

FLORIDA WILDCAT FAILURE

Collier County: Humble Oil & Refining Co. 1 Collier Corp., 27-50s-26e, dry, TD 12,600 ft.

California

New Field Appears Certain For Los Angeles County

LOS ANGELES.—A new field discovery seems assured for Castaic area of upper Santa Clara Valley, Los Angeles County. The wildcat is Ted Sterling 1 Rynne-Fisher, in NE NE Section 35-5n-17w about 1¾ miles northeast of Honor Rancho production.

On a 35-minute drill-stem test at an undisclosed depth the well during the last 10 minutes of the test flowed an estimated 1,500 to 2,000 bbl. daily. Gravity of the crude was 33° A.P.I. With hole bottomed at 4,742 ft., the production was obtained from a Mohnian sand stratigraphically lower than those being produced at Honor Rancho. At the week end the operator was running casing.

In the Aliso Canyon field some 10 miles south, Carlton Beal converted an abandoned oil producer into a new pool discovery. The well was 2 Mission Andrian in Section 34-3n-16w, drilled to 7,580 ft. and abandoned in April 1950 after being produced about one month. Taken over by Beal, a section between 6,920 and 7,320 ft. was gun perforated and the well recompleted flowing at the rate of 245 bbl. daily.

Evaluation of the importance of The Texas Co.'s recent descovery in the Arvin area of Kern County shortly will get under way. Texaco has made location for a southeast offset, 2 George in NE NW Section 23-31s-29e, and has staked a wildcat about 1 mile to the northwest of the discovery. The wildcat will be 1 Kern Valley in SE NE Section 15. In addition to these two tests Havenstrite Oil Co. is scheduled to drill a 1-mile stepout on its Richards property in Section 22.

Discovery well was the 1 George, completed in July in the Santa Margarita sand at a total depth of 6,516 ft. Located about 1 mile east of the southern end of the

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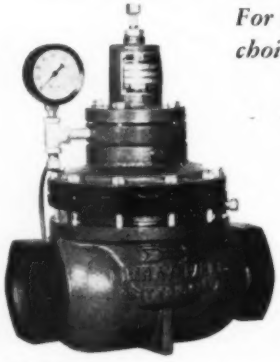

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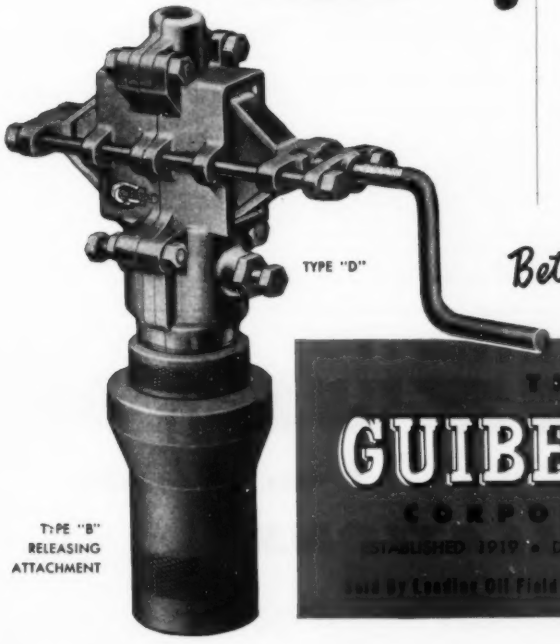

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Mountain View field, it was completed flowing 142 bbl. daily of 35°-gravity crude.

Northwest of the new Camden field about 1¼ miles, Santa Fe Drilling Co. was preparing to complete its 1 Dyson in a thin oil sand at the plugged-back depth of 6,100 ft. Located in SE NE Section 6-17s-20e, the wildcat had been drilled to 6,576 ft. with top of the oil sand called at 6,093 ft.

Discovery well was Von Glahn 1 Coleman Community in Section 8, completed last June in 10 ft. of oil sand at 6,100 ft. for 125 bbl. daily. A south offset was dry, as was a ¾-mile northeast stepout. The latter, J. V. Dougherty & Associates 38 "Well" in Section 4, was abandoned last week after drilling to 6,509 ft.

Several new wildcats were staked in the San Joaquin Valley area. About 3 miles north of Coalinga production Humble Oil & Refining Co. staked its 13-23 Pacific in Section 23-18s-15e. Southeast of Edison production about 4 miles, Cliff Zillgitt staked 2 Cliff in Section 27-30s-30e.

Among the wildcats staked in coastal counties were two by The Texas Co. In the Barrett Creek area of San Luis Obispo County, it will drill the 1 Santa Margarita Two in Section 9-32s-19e. Location also was staked for the 1 Steele in Section 1-8s-5w near Pescadero in San Mateo County. General Petroleum Corp. also staked location for a test in the Camulos area of Ventura County. It will be the 1 Camulos in Section 21-4n-18w.

CALIFORNIA SUCCESSFUL WILDCAT

Los Angeles County, new pool discovery in Aliso Canyon field: Carlton Beal 2 Mission Adrian, 34-3n-16w, flowed 245 bbl. daily, perf. 6,920-7,320 ft., 23.4° gravity, well previously abandoned in April 1950 after producing for 1 month, old TD 7,580 ft., new TD 7,330 ft., elev. 1,877 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Camden area: Julio V. Dougherty & Assoc. 38 "Well," 4-17s-20e, dry, TD 6,509 ft., elev. 246 ft.

Cantua Creek area: Humble Oil & Refining Co. B-1 S.P. Co., 25-17s-15e, dry, TD 9,895 ft., elev. 346 ft.

Panoche Creek area: L. M. Lockhart 1-36 Souza, 36-14s-12e, dry, TD 10,600 ft., elev. 432 ft.

Kern County, Edison area: Independent Exploration Co. 13 Malaga, 15-30s-29e, dry, Santa Margarita 2,705 ft., TD 3,010 ft., elev. unreported.

Los Angeles County, Lopez Canyon area: E. L. Doheney 1 E.I.D.-Reeves, 1-2n-15w, dry, TD 4,580 ft., elev. 1,640 ft.

Sacramento County, Isleton area: The Texas Co. 1 Aldrich, 17-4n-4e, dry, TD 4,445 ft., elev. 6 ft.

Sutter Island area: D. D. Dunlap & Dorothy Dunlap 1 Dunlap Natural Gas Graham Comm., 6-5n-4e, dry, TD 4,554 ft., elev. 15 ft.

Ventura County, Ramona - Holser Canyon area: Crestmont Oil Co. 1 Cooke, 14-4n-18w, dry, TD 4,000 ft., elev. 1,815 ft.

Santa Paula area: Huber & McGinnis 1 Anlauf-Betty, 21-4n-21w, dry, TD 681 ft., elev. 1,000 ft.

Rocky Mountain

Another Discovery For North Dakota

DENVER.—A new discovery for North Dakota has been made by Amerada Petroleum Corp. along the long Nesson anticline, further intensifying activity throughout the Williston basin. Amerada's 1 Harry Bakken, C SW NW 12-157n-95w, Williams County wildcat, flowed oil in 40 minutes and flowed to pits at a "fairly substantial" rate for 20 minutes on drill-stem test of the zone at 8,304-60 ft.

Amerada has not announced the producing formation, but correlation of the area places production from the Madison. The oil is 40° gravity and there was a fair gas blow with the oil. Spearfish, at 6,208 ft., is the last formation top announced by Amerada for the wildcat.

This well is 12 miles north, on a separate high, from Amerada's Beaver Lodge discovery which is producing from the zone 10,490-10,530 ft. in Devonian. The Beaver Lodge well was the first commercial producer in the basin, and is now flowing 200 bbl. of 38°-gravity oil in the 12 hours the well is open daily. Amerada is below 6,278 ft. at 1 Binhomer-Risser, C SW SE 12-149n-96w, McKenzie County, south of the Beaver Lodge discovery, and is also drilling another well in Beaver Lodge pool.

West of the Nesson anticline area in eastern Montana, Shell is coring ahead on the Richey area wildcat, Dawson County. The well is 1 Northern Pacific, SE NW NW 19-23n-50e, now below 8,252 ft. after recovering oil from Upper Mississippian (Charles ?) at around 7,200 ft. This well is headed for Devonian. Shell is coring below 7,775 ft. with Charles topped at 6,988 ft., at the Pine unit wildcat in the SW SW NE 30-12n-57e, Wibaux County, southeast of the Richey wildcat. With the recovery of oil from Madison (?) at the Amerada Tioga wildcat there are now three distinct producing formations in the west-central portion of the Williston basin.

New wildcats are planned throughout the entire basin area, as the exploratory play further increases. The California Co. will soon announce location for a wildcat on a block in Bottineau County, north-central North Dakota, following seismic work through this area. H. L. Hunt of Dallas plans a simultaneous program of three wildcats along the east-central portion of the basin, with several major operators contributing. New wildcats are slated for South Dakota, where only drilling operation is Shell Oil's Perkins County wildcat at 1 Homme, C NW SE 13-20n-12e, now below 6,015 ft. The well found Spearfish at 5,026 ft. and had only slight gas shows in upper sands.

WYOMING WILDCAT FAILURES

Mercer Dome, Big Horn County: M. E. Davis 1 Government, NW NE SW 33-51n-90w, TD 3,002 ft., dry, Chugwater 480 ft., Dinwoody 1,180 ft., Tensleep 1,455 ft., Madison 1,868 ft., Deadwood 2,998 ft.

North Big Muddy, Converse County: Stanolind Oil & Gas Co. 1 Government, C NE SE 34-34n-76w, TD 6,864 ft., dry, Muddy 6,502 ft., Dakota 6,690 ft., Fuson 6,712 ft., Lakota 6,783 ft.

Longs Creek, Fremont County: Sun Oil Co. 1 Government-Downing, C NW SE 32-32n-94w, TD 5,959 ft., dry, First Frontier 1,738 ft., second Frontier 1,930 ft., third Frontier 2,122 ft., fourth Frontier 2,254 ft., fifth Frontier 2,382 ft., Mowry 2,430 ft., Muddy 3,000 ft., Thermopolis 3,042 ft., Dakota 3,180 ft., Lakota 3,238 ft., Morrison 3,350 ft., Sundance 3,550 ft., Nugget 3,910 ft., Chugwater 4,198 ft., Phosphoria 5,554 ft., Tensleep 5,942 ft.

Pretty Water unit, Sweetwater County: Mountain Fuel Supply Co. 1 Capital Co., SE SW NE 10-15n-104w, TD 4,365 ft., dry, Baxter 650 ft., Frontier 3,599 ft., Aspen 3,693 ft., Dakota 4,027 ft., Morrison 4,305 ft.

Sage Basin, Carbon County: Signal Oil & Gas Co. 2 State, NW NW SE 35-17n-88w, TD 1,438 ft., dry, Chugwater 155 ft., Tensleep 803 ft., Amsden 958 (?) ft., Madison 1,188 ft., Cambrian 1,390 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Eldred Ranch, Garden County: McCarty-Coleman 1 Eldred Ranch, SE SE SE 25-20n-46w, TD 3,907 ft., dry, Muddy 3,363 ft., Skull Ck. 3,602 ft., Dakota 3,752 ft.

Wildcat, Kimball County: Olds Oil Co. 1 Haler, SE SE SW 33-15n-53w, TD 5,622 ft., dry, Greenhorn 5,105 ft., D sand 5,398 ft., G sand 5,446 ft., J sand 5,521 ft.

Trigood Oil Co. 1 Nelson, SE SE SE 28-14n-53w, TD 5,690 ft. dry, Greenhorn 5,255 ft., D sand 5,519 ft., J sand 5,638 ft.

Appalachian-Ohio

Garrett County, Maryland, Has Two New Operations

PITTSBURGH.—Two new operations have been started in Garrett County, Maryland. Mid Atlantic Oil & Gas Co. will drill 1 Odd Fellows and Clarksburg Gas Co. is spudding, 1 T. W. Ashby.

Blaho Oil & Gas Co. 1 Dorcie Rumer, elevation 2,490 ft., is drilling at 3,525 ft. The Tully lime in this well was recorded at 3,202 ft.

Mid Atlantic Oil & Gas Co. 1 Blair Simmons, elevation 3,480 ft., is drilling at 4,129 ft. A gas sand found at 3,973-4,005 ft. tested 184,000 cu. ft. The Oriskany sand was topped at 4,079 ft.

In Gore district, Hampshire County, West Virginia, T. M. Pettigrew et al 1 John Timbrook, elevation 1,198 ft., is drilling at 1,755 ft.

In Williamsburg district, Greenbrier County, Deep Rock Oil Corp. 1 Bertha H. Thornbury et ti, elevation 2,526 ft., is drilling at 2,526 ft.

Other drilling depth reports for West Virginig are as follows: United Fuel Gas Co. 1-6478 A. W. Hicks, elevation 2,834 ft., Beaver Pond district, Mercer County, is drilling at 7,114 ft. Hope Natural Gas Co. 9634 Power Oil Co., elevation 1,039 ft., Walker district, Wood County, is drilling at 4,192 ft. in the Corniferous lime, topped at 4,015 ft. Hope Natural 9638 Margaret C. Kraus, elevation 2,128 ft., Union district, Preston County, is drilling at 2,010 ft. In Portland district Hope Natural 9,665 J. Paul Martin, elevation 2,308 ft., is drilling at 563 ft. Hope 9673 Nina Kay, elevation 2,296 ft., is drilling at 109 ft.

Central Area

ILLINOIS

Ralph Halbert and associates have completed their 1 Auten heirs, NW NW SW 32-6s-5e, to open a new producing area in the Rural Hill district of southwestern Hamilton County. The well pumped and flowed 296 bbl. of oil in 24 hours. Pay zone is Aux Vases sand at 3,236-47 ft. with open hole below 3,230 ft. Location is 2 miles west of Rural Hill and 4 miles northeast of Thompsonville (Franklin County). It is a mile north of the Cantrell pool and about the same distance southwest of production of the Rural Hill pool.

The Texas Co. 1 Sinnickson, NW SW NW 10-6n-5e, which opens a new Rosiclare lime pool in the Mason area, southern Ellingham County, pumped 65 bbl. of oil with 7 bbl. of water per day at completion. Saturation is at 2,364-72 ft. and 2,394-2,422 ft. Total depth is 2,521 ft. Location is 2 miles north of Mason and about 1½ miles north of nearest production in the pool by the same name.

In the same general area, 1½ miles southwest of Mason and 3½ miles southwest of The Texas Co.'s new producer, D. H. Bolin has another Rosiclare discovery where he is testing his 1 Hetzel, SW SW NE 33-6n-5e. With casing perforated at 2,461-62 ft., the well swabbed 3 bbl. of oil and 3 bbl. of water per hour. Previous tests of McClosky lime at 2,488-92 ft. yielded 30 bbl. of oil and 15 bbl. of water per day. Hole is plugged back from that pay to 2,470 ft. The location is west of the South Mason area of the Iola Consolidated pool.

Paul Schoendienst found good saturation in Cypress sand at his 1 Glaser, SW SW NW 11-1n-3w, 5 miles south of Carlyle, southern Clinton County. Saturation was logged at 1,075-90 ft. Casing was run to the top and cable tools are being moved in to drill out plug and test. Location is 1½ miles east of the Bartelso pool.

WESTERN KENTUCKY

Joe Reznik and associates are opening a new pool 6 miles northeast of Henderson, northern Henderson County, where their 1 Farley, C SE 15-Q-25, flowed at the rate of 10 bbl. of oil per hour while testing O'Hara lime saturation at 2,319-24 ft. Nearest production is in the Zion pool, 2½ miles to the southeast.

Three miles southwest of Henderson, George S. Engle 1 W. T. Posey estate, 14-P-23, another new discovery well, pumped 67 bbl. of oil in 14 hours after acidizing. Pay zone is McClosky lime, open at 2,594-99 ft.

The same operator's 1 Alex Posey, ½ mile further south in 17-P-23, and a prospective Waltersburg sand discovery well, is cleaning out to test. Pay zone was logged at 1,683-1,710 ft. In the meantime, this operator's 2 Alex Posey, first confirmation well for the discovery, also has reached the pay and has run casing after recovering 315 ft. of oil and 65 ft. of oil-cut mud in a 2-hour drill-stem test. Pay in the second well was logged at 1,731-38 ft.

EASTERN KENTUCKY

In the Pilot pool of eastern Estill County, W. W. Toller Drilling Co. has completed 1 McQuinn Heirs for 20 bbl. oil per day. Located on Evans Branch the well is producing from Corniferous lime at a total depth of 928 ft. Top of Corniferous was 883 ft.

In Big Sandy gas field on Levisa Fork in Pike County Columbian Fuel Corp. has drilled deeper at 1 Floyd Justice and completed for 328,000 cu. ft. gas daily from Devonian black shale from 2,980-3,814 ft. Well had previously been producing from Big lime formation.

Also in Big Sandy gas field in Pike County sector, United Fuel Gas Co. drilled deeper from the Maxon sand to the Devonian shales and completed 6574 H. C. Stratton for 805,000 cu. ft. gas daily from both the Maxon and shale. Maxon produces from 1,594-1,648 ft. and shale from 2,678-3,440 ft., total depth.

MICHIGAN

Don Rayburn had the first follow-up producer in the Skeels Dundee dolomite oil pool, Sherman Township, Gladwin County, this week at his 3A Cassiday, NW NW SE 30-20n-2w, the seventh follow-up test of the field discovery, while Socony-Vacuum Oil Co. was testing a flowing oil pay in the Detroit River "sour" zone horizon at 1 Pierson, NE NW NW 11-17n-1e, Billings field, Billings Township, Gladwin County.

Rayburn's 3A-Cassiday, just 470 ft. northwest of the Skeels Dundee discovery well, was being flowed at 50 bbl. an hour nat-

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ural through a restricted choke immediately after drill-in and was scheduled to be pinched back to 25 bbl. an hour for 8 hours a day. Rayburn, who drilled the discovery; four of the six offsetting dry holes that preceded second producer. Sun Oil Co. drilled the other two. The Dundee was logged at 3,866 ft. and hole was bottomed out in flowing production at 3,869 ft. Pay showed from 3,868-69 ft.

In Billings field, Gladwin County, Socony-Vacuum Oil Co. appeared to have its second Detroit River zone producer at 1 Pierson when well flowed 50 bbl. natural in less than 12 hours while completion was in progress. This new producer appeared to be destined for completion as the best well in the pool from either the Dundee or Detroit River pays.

First oil showed in this lower horizon from 4,075-78 ft. after 5-in. casing had been set at 4,053 ft. Well filled and flowed 25 bbl. in 6 hours. While deepening was in progress to 4,082 ft., the well flowed another 25 bbl. in 5 hours. Further testing was in progress at this point. Plans were being outlined this week by both Socony-Vacuum Oil Co. and Chapman Oil Co., producers of Dundee offset wells, for further Detroit River objective drilling in the pool.

ILLINOIS SUCCESSFUL WILDCATS

Effingham County: The Texas Co. 1 Sinnickson, NW SW NW 10-6n-5e, IP 65 bbl., Rosiclare 2,364-72 ft., and 2,394-2,422 ft., TD 2,521 ft. (opens new pool).

Hamilton County: Ralph Halbert et al 1 Auten heirs, NW NW SW 32-6s-5e, IP 296 bbl., Aux Vases 3,235-47 ft., TD 3,247 ft. (opens new pool).

Richland County: R. Hal Compton et al 1 Ivey, SW NE NW 15-2n-14w, IP 600 bbl., McClosky 3,072-79 ft., TD 3,079 ft. (extension Parkersburg Consolidated pool).

White County: N. V. Duncan and Ashland Oil & Refining Co. 1 Hall, NE SW SW 36-5s-9e, IP 35 bbl., Rosiclare 3,144-52 ft., TD 3,270 ft.

Slagter Producing Co. 1 Bishop, SE NE SE 34-6s-9e, IP 10 bbl., McClosky 3,058-62 ft., TD 3,114 ft.

ILLINOIS WILDCAT FAILURES

Bond County: J. William Everhart 1 Thomason, NE NE SW 18-4n-2w, dry, TD 2,550 ft.

James C. Nickerson 1 Doll, SE SE SE 28-4n-3w, dry, TD 1,105 ft.

Christian County: Gulf Refining Co. 1 Siegert, SE SE SW 28-11n-1w, dry, TD 2,834 ft.

Clinton County: Mark Twain Oil Co. 1 Voss, NW NW NE 14-2n-4w, dry, TD 2,385 ft.

Edwards County: Stanford Oil Co. 1 Reid, NE NE SE 10-1s-10e, dry, TD 3,395 ft.

Edgar County: J. William Everhart 1 Dennis, NE NW NW 3-13n-11w, dry, TD 2,135 ft.

Effingham County: Superior Oil Co. 1 Gawthorp, SW SE NW 27-6n-6e, dry, TD 3,009 ft.

Fayette County: Ralph Carter 1 Manley, NE SW SW 9-4n-1w, dry, TD 1,428 ft.

The Texas Co. 1 Willett, SW SW SW 27-5n-1e, dry, TD 1,911 ft.

The Texas Co. 1 Schwarm, NW NW SW 29-6n-3e, dry, TD 2,222 ft.

Budd Mansfield 1 Larsen, SW SE SW 24-9n-3e, dry, TD 1,604 ft.

Hamilton County: Mark Twain Oil Co. 1 Niksch, SE NW NE 32-5s-7e, dry, TD 3,371 ft.

Will I. Lewis 1 Harrelson, SE SW NW 33-6s-5e, dry, TD 3,345 ft.

Jasper County: C. B. Mansfield 1 Meryman, NE SE NW 6-5n-9e, dry, TD 3,161 ft.

Macon County: Pure Oil Co. 1 De Vore, NE NE NW 20-15n-2e, dry, TD 2,452 ft.

Marion County: National Associated Petroleum Co. 1-A Smith, SW SE SW 36-1n-4e, dry, TD 2,960 ft.

Richland County: George & Wrather and Illinois Mid-Continent Co. 1 Berry, SE SW SE 14-2n-14w, dry, TD 3,025 ft.

W. E. Witt et al 1 Harlan, NW SW SW 35-3n-9e, dry, TD 3,245 ft.

Wabash County: Nash Redwine 1 Merritt, SE SW SW 6-3s-9e, dry, TD 3,477 ft.

INDIANA SUCCESSFUL WILDCATS

Posey County: Ashland Oil & Refining Co. and Dee Miller 1 Dirschauer, NW SW SW 27-6s-12w, IP 168 bbl., Aux Vases sand 2,634-46 ft., TD 2,446 ft. (new pay zone Ford South pool).

Superior Oil Co. 1 Breiner, NW NW SE 10-7s-13w, IP 60 bbl., Waltersburg 1,880-94 ft. and Tar Sands 1,996-2,010 ft., TD 2,810 ft. (opens new pool).

INDIANA WILDCAT FAILURES

Daviess County: P. E. and B. O. Colby 2 Hart, NE NW NE 12-4n-6w, dry, TD 748 ft.

Perry County: Clark County Oil Research Co. 1 Kelly, NE SE NE 25-3s-2w, dry, TD 263 ft.

Clark County Oil Research Co. 2 Kelly, SE SE NE 25-3s-2w, dry, TD 292 ft.

Pike County: S. W. Southerland 1 Oakland, NE NE SE 33-1s-8w, dry, TD 1,300 ft.

Posey County: G. L. Reasor 1 Bottomly, NW SW SE 11-6s-14w, dry, TD 3,058 ft.

Spencer County: Charles Meier 1 Vance, NW SE SW 10-6s-5w, dry, TD 1,235 ft.

Sullivan County: T & H Corp. 1 C. & E. I., NW NW SE 15-7n-9w, dry, TD 2,595 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

McLean County: J. C. Miller and Ashland Oil & Refining Co. 1 Kennedy, SW SE NW NW 15-N-27, IP 18 bbl., Palestine 1,554-70 ft., TD 1,570 ft. (extension Wyman pool).

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WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Joe Resnik 1 Gregory, NW NW SE 12-P-26, dry, TD 1,820 ft.

Joe Resnik 1 Adams, S½ NW SW NE 11-P-26, dry, TD 2,140 ft.

Union County: Bann Drilling Co. and J. C. Ellis 1 Russell, E½ SW SE NE 9-M-20, dry, TD 3,255 ft.

MICHIGAN SUCCESSFUL WILDCAT

Barry County, Johnston Township: Universal Drilling Co. 1 Fry, SW NE NE 17-1n-8w, Traverse 1857 ft., 5 bbl. after acid, TD 1,899 ft., PBTD 1,868 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Clyde Township: F. W. Kehlet 1 Dutton, SW SE NE 36-2n-15w, Traverse 1,290 ft., dry, TD 1,334 ft.

Ganges Township: Ford Oil Co. 1 McKeown, NE NE SW 23-2n-16w, Traverse 1,217 ft., dry, TD 1,236 ft.

Louis Zellman 1 Wilkenson, NF SE SE 27-2n-16w, Traverse 1,181 ft., dry, TD 1,186 ft.

Arenac County, Lincoln Township: E. Edwin Brehm and Norman Carr 1 Peters, NW NW SE 29-18n-4e, dry in Richfield, TD 4,347 ft.

Clinton County, Dallas Township: Thomas B. Mask 1 Sturgis, SW SW NE 11-7n-4w, Dundee 2,884 ft., dry, TD 2,907 ft.

Mecosta County, Sheridan Township: Merrill Drilling Co. and Wm. B. Darke 1 Fate & Weis et al, SW NW SW 27-15n-7w, Dundee 3,837 ft., dry, TD 3,842 ft.

Midland County, Greendale Township: Burks White 1 Mich. Surety Co. et al, NE NE NE 19-14n-2w, Dundee 3,515 ft., dry, TD 3,814 ft.

Oceana County, Crystal Township: Wm. C. Vandenberg, Jr., 1 Kubon, NE SW NE 5-16n-16w, Dundee 2,245 ft., dry, TD 3,120 ft.

St. Joseph County, Flowerfield Township: 1 Eberhard & May, SE SE SE 5-5s-12w, Traverse 1,112 ft., dry, TD 1,140 ft.

Van Buren County, Waverly Township: W. D. Gannett 1 Habogh, NE NW SE 35-2s-14w, Traverse 1,073 ft., dry, TD 1,085 ft.

Louisiana-Arkansas

Extension or Discovery At Saline Lake Field

SHREVEPORT.—Hunt Oil Co. and Gulf Refining Co. have extended Saline Lake field of Catahoula Parish 1 mile to the southeast or have opened up a new field with completion of their 44 Louisiana Delta Hardwood Lumber Co., 7-4n-5e.

On official state test this discovery or extension well pumped 91 bbl. of oil daily from the Wilcox at 5,930-34 and 5,942-45 ft. Well was drilled to a total depth of 6,049 ft. Casing was set at 6,012 ft.

About 5 miles north of Shreveport, Butler Johnson Service Corp. completed 1 Sentell as a Cotton Valley discovery for Caddo Parish. No gage has been made available yet. Completion was made from perforations at 8,322-44 ft.

This discovery indicated gas-distillate production on a 15-minute drill-stem test of the Bodcaw sand in the Cotton Valley at 8,328-48 ft. Recovery was three stands of distillate-cut water cushion with no indication of formation water. Cores indicated 21 ft. of porous sand with gas-distillate taste and good fluorescence. Location is 1,042 ft. south and 3,186 ft. east from the northwest corner of 35-19n-14w.

Athens field, Claiborne Parish, has a new dual producer. Skelly Oil Co. 1 C. M. Bowen, 23-20n-7w, is producing from the Hill and the Hosston. The Hill tested gas at the rate of 53,000,000 cu. ft. daily on open flow with about 10 bbl. of distillate per million cubic feet from perforations at 5,132-42 ft. The Hosston yielded 15,500,000 cu. ft. of gas per day on open flow from perforations at 6,286-6,308 ft.

In Prairie County, Central Arkansas, Curtis-West Drilling Co. has staked location for 1 George Day. Spot is 400 ft. from north line and 340 ft. from west line NW SW 1-1n-5w. This puts it about 50 miles east of Little Rock and 3 miles northeast of Tollville. It is a proposed 3,000-ft. test.

This rank wildcat is 12 miles south and 3 miles east of M. W. Martin 1 Stewart, a 3,163-ft. dry hole completed in June 1946.

At Murphy Corp. 1-A Robertson, 2½ miles southeast of Hibank field, Union County, swabbing operations yielded 12 bbl. of oil and 18 bbl. of salt water from the Travis Peak perforated at 3,620-26 ft. Location is SE NE 33-18s-14w.

NORTH LOUISIANA SUCCESSFUL WILDCAT

La Salle Parish: Carter Oil Co. 1 State Catahoula, 4,620 ft. S and 3,300 ft. W of NEc 22-7n-4e, flowed 108 bbl. of 38.6°-gravity oil daily through ⅛-in. choke from Wilcox at 4,112-14 ft., TD 5,400 ft.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Cryer and Halbouty 1 E. Moorey, 2,067 ft. N and 2,490 ft. E of SWc 28-19n-11w, dry, TD 3,600 ft. This was a deep test in old Bellevue pool.

Concordia Parish: Hunt Oil Co. and Gulf Refining Co. 3-E Fisher Lumber Co., NW SW 14-7n-8e, dry, TD 6,772 ft.

La Salle Parish: Hunt Oil Co. and Gulf Refining Co. 60 Louisiana Delta Lumber Co., SW SW 10-5n-4e, dry, TD 5,500 ft.

Richardson and Bass 1-D Madison Oil & Development Co., NE SE 3-5n-8e, dry, TD 8,250 ft.

J. S. Michael et al 3-M Nebo Oil Co., NW NE 16-8n-3e, dry, TD 4,882 ft.

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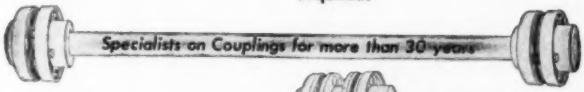

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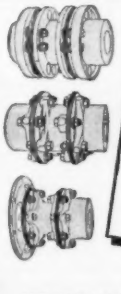

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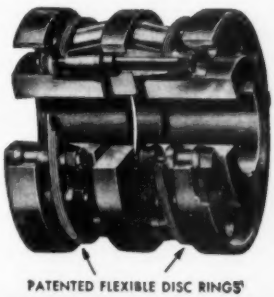

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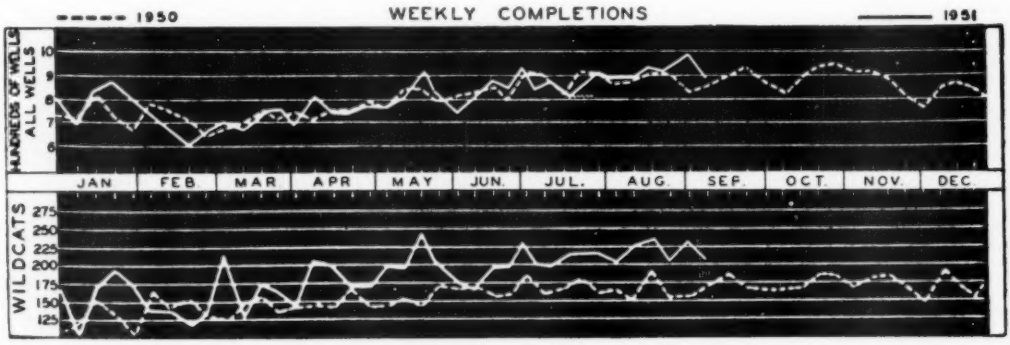
CURRENT STATISTICS

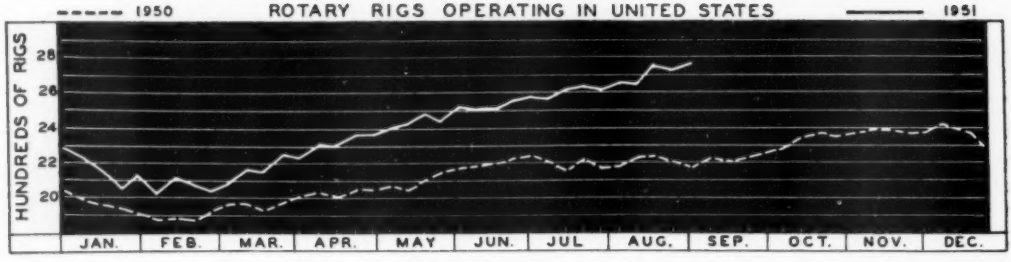
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 8, 1951

	Total of all wells					Sept. 8		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	9	0	*9	25,408	436	476	0	0	0	0	0	0	0	0	0	0
Pennsylvania	38	20	6	†12	73,948	969	931	0	0	0	0	0	0	0	0	1	1
West Virginia	11	0	10	1	33,762	386	464	0	0	0	0	0	0	0	9	6	15
Ohio	21	9	2	10	33,255	644	680	0	0	0	0	0	1	0	5	16	22
Indiana	31	14	0	17	60,004	852	1,094	2	0	0	7	9	32	0	1	231	264
Kentucky	27	12	2	13	53,305	816	756	1	0	0	3	4	17	0	1	112	130
Illinois	52	35	0	17	142,968	1,628	1,861	5	0	0	19	24	52	0	0	373	425
Michigan	24	11	0	13	62,194	537	602	1	0	0	10	11	16	0	7	206	229
Kansas	87	47	5	35	297,300	3,015	2,616	2	0	1	18	21	149	1	12	607	769
Nebraska	6	2	0	4	29,706	160	67	0	0	0	3	3	6	0	1	78	85
Oklahoma	141	79	10	‡52	525,431	3,868	3,706	2	1	0	16	19	130	3	16	496	645
Texas	303	189	13	101	1,408,564	11,446	11,218	13	0	2	73	88	506	38	84	2,345	2,973
North Central (Dist. 7-B & 9)	84	44	1	§39	282,476	3,476	3,403	5	0	1	27	33	245	2	12	999	1,258
West (Dist. 7-C & 8)	108	87	1	20	583,680	3,461	3,367	5	0	0	18	23	122	9	6	444	581
Panhandle (Dist. 10)	16	7	7	2	52,845	437	637	0	0	0	1	1	2	0	0	16	18
Eastern (Dist. 5 & 6)	25	15	0	10	129,730	838	808	1	0	0	7	8	9	6	0	169	184
Gulf Coast (Dist. 2 & 3)	28	20	2	6	187,259	1,583	1,562	1	0	0	4	5	64	14	42	326	446
Southwest (Dist. 1 & 4)	42	16	2	24	172,774	1,601	1,441	1	0	1	16	18	64	7	24	391	486
Louisiana	36	17	5	14	213,213	1,430	1,691	1	0	0	5	6	30	6	5	192	233
Northern	22	9	4	9	71,469	771	910	1	0	0	5	6	8	0	3	114	125
Southern	14	8	1	5	141,744	659	781	0	0	0	0	0	22	6	2	78	108
Arkansas	7	6	0	1	21,471	274	284	0	0	0	0	0	10	0	3	57	70
Mississippi	7	4	1	2	47,596	238	225	1	0	0	2	3	11	3	0	92	106
Southeastern States	1	0	0	1	12,600	36	44	0	0	0	1	1	0	0	0	15	15
Montana	4	1	1	2	7,774	143	150	0	0	0	0	0	0	0	0	32	32
Wyoming	17	9	0	8	82,737	507	398	0	0	0	5	5	7	0	1	72	80
Colorado-Utah	9	7	1	1	42,472	184	83	0	0	0	0	0	6	0	4	88	98
New Mexico	5	4	0	1	41,372	431	427	2	0	0	1	3	13	0	7	50	70
California	47	35	2	10	214,716	1,545	1,227	1	0	0	9	10	32	0	2	310	344
Miscellaneous	0	0	0	0	0	53	37	0	0	0	0	0	1	0	19	17	37
Total United States	892	510	58	324	3,429,796	29,598	29,007	31	1	3	172	207	1,019	51	177	5,396	6,643
Total previous week	993	513	78	402	3,813,271			33	2	3	194	232	988	50	174	5,224	6,436
Total September 8, 1950	850	449	73	328	3,184,530			24	2	13	130	169	736	53	137	4,308	5,261

Service wells included: *9, †3, ‡1, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Sept. 8 crude oil	B. of M. Sept. demand	Sept. 1 crude oil
Alabama	2,850	2,400	2,900
Arkansas	76,100	84,000	76,150
California	980,400	975,000	977,600
Colorado	77,800	77,000	77,700
Eastern	59,250	62,000	59,750
Florida	1,675	1,600	1,525
Illinois	167,500	160,000	168,100
Indiana	31,300	29,000	32,400
Kansas	312,450	320,000	322,050
Kentucky	32,000	29,000	31,700
Louisiana	626,700	668,000	612,300
North Louisiana	113,800		113,700
South Louisiana	512,900		458,600
Michigan	36,400	40,000	38,600
Mississippi	98,900	102,000	99,700
Montana	24,900	25,000	24,600
Nebraska	6,100	8,000	6,030
New Mexico	145,575	154,000	145,575
Oklahoma	505,850	530,000	506,300
Texas	2,827,600	2,600,000	2,780,475
Dist. 1 (Southwest)	33,575		33,575
Dist. 4 (Southwest)	259,450		257,975
Dist. 2 (Gulf Coast)	166,475		161,925
Dist. 3 (Gulf Coast)	486,675		476,025
Dist. 5 (Eastern)	57,100		55,900
Dist. 6 (Eastern)	117,950		115,925
East Texas field	277,200		272,150
Dist. 7-C (West)	108,350		104,950
Dist. 8 (West)	992,925		974,175
Dist. 7-B (W. Central)	83,600		82,150
Dist. 9 (N. Central)	159,550		159,900
Dist. 10 (Panhandle)	84,750		85,825
Utah	3,800	5,000	3,900
Wyoming	189,200	178,000	190,100
Total United States	*6,206,350	6,140,000	6,157,675
Change from previous week, up	48,675		
Canada	129,330		174,300

Total U. S. production January 1-September 8 †1,524,872,300 bbl.
Same period last year (crude plus cond.) 1,312,031,230 bbl.

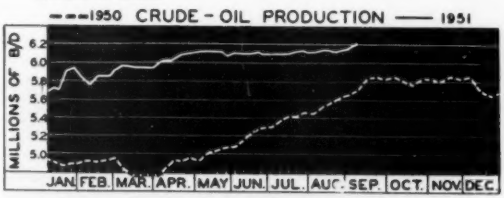
*Not including 102,955 bbl. condensate. †Including 26,389,860 bbl. condensate.

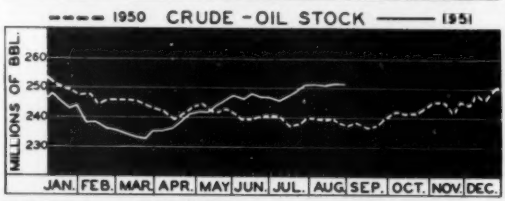
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

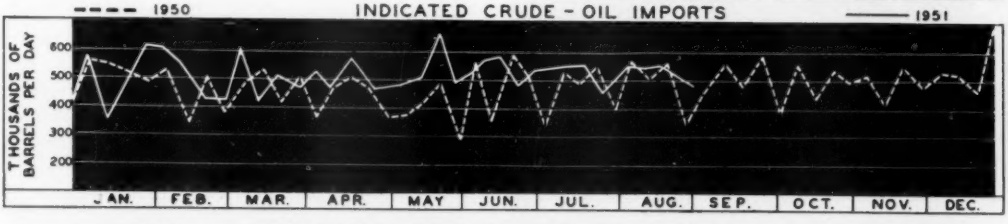
(Thousands of barrels)

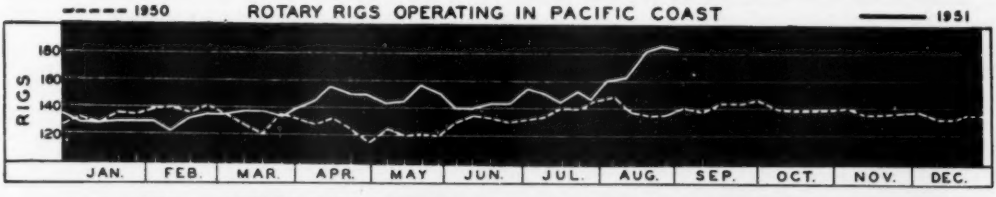
	Sept. 1, 1951	Aug. 25, 1951	Sept. 2, 1950
Pennsylvania Grade	2,091	2,111	2,554
Other Appalachian	1,666	1,663	1,353
Illinois, Indiana, Michigan	11,380	11,049	9,662
Arkansas	2,514	2,650	2,900
Louisiana	14,645	14,283	14,609
North	2,756	2,748	3,173
Gulf	11,889	11,535	11,436
Mississippi	2,681	3,151	2,485
New Mexico	6,417	6,461	5,908
Oklahoma and Kansas	38,420	38,563	33,501
Texas	120,963	120,262	115,937
East Texas	15,141	14,907	14,844
West Texas	51,010	50,804	44,207
Texas Gulf	26,907	26,761	28,912
Other Texas	27,905	27,850	27,974
Rocky Mountain	13,049	13,353	10,843
California	30,357	30,445	32,529
Foreign	7,975	8,266	5,825
Total	252,158	252,257	238,106

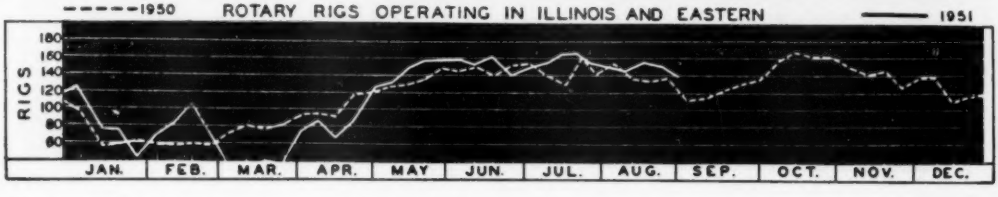
*Bureau of Mines.









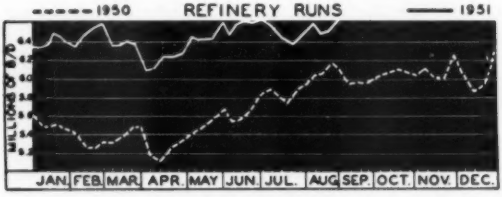


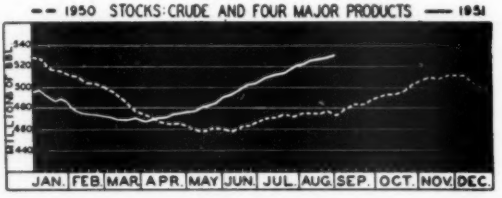
A.P.I. REFINERY REPORT, SEPTEMBER 1

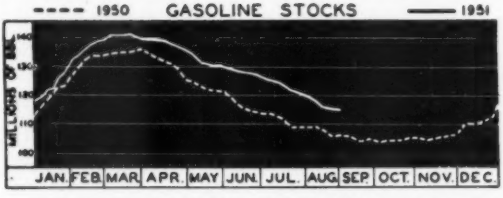
(Thousands of barrels)

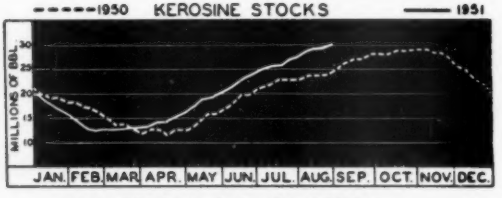
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, August 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,044	428.8	48.4	263.7	233.8	24,946	11,010	28,099	12,241	976	410.4	34.3	207.8	210.2
Appalachian:														
District 1	111	49.3	5.9	21.4	12.4	2,770	674	1,043	656	100	42.3	5.0	13.4	9.4
District 2	71	34.3	2.7	8.1	12.6	1,444	333	355	295	69	33.6	4.0	7.3	13.5
Ind., Ill., Ky.	1,226	641.7	83.3	195.4	156.3	25,207	6,798	19,328	5,675	1,070	583.3	64.0	166.9	137.0
Okla., Kans., Mo.	497	267.3	17.0	119.7	57.0	11,786	1,861	10,313	1,839	531	288.9	13.8	118.9	61.7
Inland Texas	266	170.6	11.6	44.9	42.1	3,672	524	1,618	1,084	225	140.3	10.5	32.0	40.0
Texas Gulf Coast	1,615	764.6	126.3	327.3	273.6	17,928	5,046	10,496	6,643	1,385	653.8	104.3	281.4	231.5
La. Gulf Coast	515	229.9	63.7	173.9	71.0	6,145	2,710	4,172	2,152	489	234.2	59.1	99.5	61.5
N. La. and Ark.	86	36.1	7.9	17.4	7.9	2,482	533	958	167	71	27.3	6.1	14.2	11.6
Rocky Mountain:														
New Mexico	15	7.6		2.9	3.9	133		69	37	15	8.1	.3	2.7	3.5
Other Rocky Mtn.	232	101.9	3.7	44.3	43.4	4,076	407	2,096	1,136	206	89.3	4.7	39.1	37.1
California	988	430.8	4.1	148.4	349.6	14,412	521	8,735	15,671	930	419.8	10.9	106.0	330.9
September 1, 1951	6,666	3,162.9	374.6	1,367.4	1,263.6	115,201	30,417	87,282	47,596	6,067	2,931.5	317.0	1,089.2	1,147.9
August 25, 1951	6,500	3,084.6	322.0	1,251.6	1,251.9	115,934	29,504	85,543	46,753					
September 2, 1950	6,109	2,881.6	330.0	1,117.9	1,174.1	105,563	25,670	69,179	41,437					

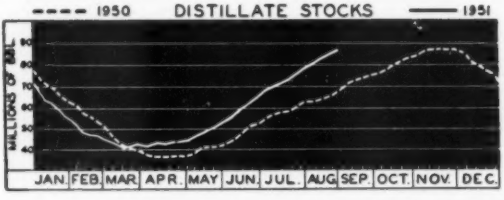
*At refineries including natural blended. †Finished and unfinished.

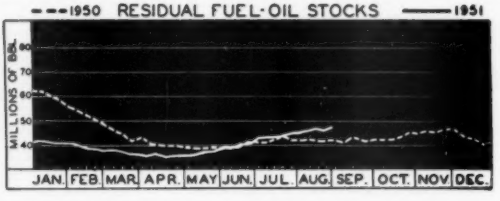


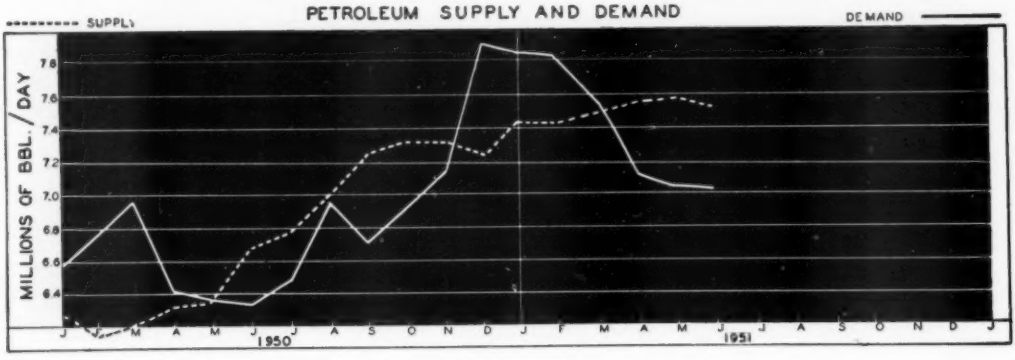












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	...	...	...
19-19.9	1.98	...	...	...
20-20.9	2.03	$2.25	...	$2.12
21-21.9	2.07	2.27	...	2.14
22-22.9	2.12	2.29	...	2.16
23-23.9	2.18	2.31	...	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	...	2.51	2.74	2.38
34-34.9	...	2.53	2.76	2.40
35-35.9	...	2.55	2.78	2.42
36-36.9	...	2.57	2.80	2.44
37-37.9	...	2.59	2.82	2.46
38-38.9	...	2.61	2.84	2.48
39-39.9	...	2.63	2.86	2.50
40 and above	...	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.63

*37°-37.9°. †35° and above.

STRENGTH in the natural-gasoline market resulted in an increase in price of .375 cent a gallon to 5.875 cents for grade 26-70 on the Group 3 market and 5.375 cents in North Texas. Current postings are still 1 cent under prices existing at the end of last year. Demands for natural under the new prices indicate that this product may follow a normal upward trend for the remainder of the year despite a motor-fuel market that tends to be slightly soft. Greater demand for natural is due to increased refinery production of fall and winter grades of motor fuel. The one deterring factor is the probable shortage of tetraethyl lead for the last quarter.

The reported sale of 80,000 bbl. of No. 2 fuel by a refiner in East Texas for delivery to the Gulf Coast indicates a probable trend for the heating season. Refiners in this area with favorable rail rates to tidewater can help to meet the record demands expected on the Gulf Coast. Increased exports, resulting from the loss of production at Abadan, plus normal gains in domestic demand on the East Coast will bring winter shipments of fuels from Gulf Coast ports to an all-time high. The Gulf Coast low for No. 2 fuel is 8 cents a gallon.

Coastwise tanker rates for clean ships range from 35 to 42 per cent over the Maritime Commission base or from 1.22 cents to 1.29 cents a gallon for No. 2 fuel for September liftings. Since the spot barge price in New York Harbor is about 9 cents, any material moved at current prices cannot be replaced through spot purchases on the Gulf Coast except at higher costs.

Another increase was reported for natural gasoline effective September 11, raising Grade 26-70 to 6.375 cents a gallon for Group 3 and 5.875 cents for North Texas.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of September 10, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10	9
No. 2 straw fuel oil	8-8⅜	9	8
No. 6 residual	$1.70-1.80	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.05	6.55	6.80

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

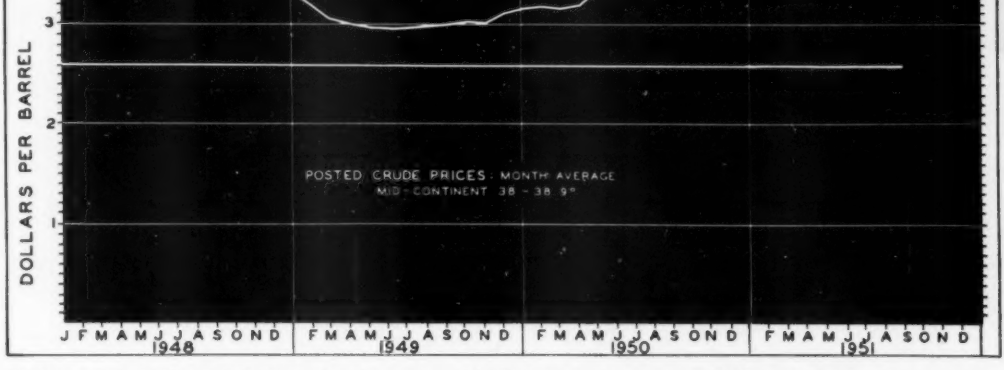
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.51 for week ended September 1, $3.47 for previous week, and $3.47 for August 1950.

Troubled with High Carbon on Cat?

CATALYTIC CRACKING UNITS OPERATING TO CARBON BURNING LIMITATION NEED:

1. EFFICIENT UTILIZATION OF OXYGEN.
2. LOW CARBON ON REGENERATED CATALYST FOR HIGHEST CRACKING EFFICIENCY.
3. FREEDOM FROM SECONDARY COMBUSTION OF CO TO CO_2.

FILTROL* NATURAL CATALYST GIVES ALL THREE WITH CONSEQUENT IMPROVEMENT IN CAT CRACKER PERFORMANCE.

OTHER
REASONS FOR USING
FILTROL CATALYSTS

1. HIGHER OCTANE BARRELS
2. HIGH BUTYLENE YIELDS
3. LOW COST
4. SULPHUR RESISTANT CATALYSTS
5. FASTER REGENERATION RATE
6. LOW ATTRITION RATE
7. TECHNICAL SERVICE
8. UNIFORMITY
9. LOWERED EXCESS BUTANE
10. VARIED PLANT FACILITIES

Filtrol

FILTROL CORPORATION

OFFICES: 727 WEST SEVENTH STREET, LOS ANGELES 17, CALIFORNIA
PLANTS: VERNON, CALIF.; JACKSON, MISS.; SALT LAKE CITY, UTAH

CATALYSTS AND ADSORBENTS

EQUIPMENT MEN

Billings to Head Pipe Line Sales at Thornhill-Craver

Thornhill - Craver Co. has placed Tom Billings in charge of sales for its pipe - line department, with headquarters in Houston.

Before joining Thornhill - Craver, Billings was a petroleum engineer with Gulf Oil Corp., and is a graduate of the University of Texas petroleum-engineering school.

Thornhill-Craver manufacturers Unibolt products including hinged coupligns with banking plugs for scraper traps, terminal manifolds, strainers and blow-downs.

Tom Billings of Thornhill-Craver Co. pipeline sales department, demonstrates to Ken V. Galt of Neal & Massy Engineering Co. the ease with which the 32-in. Unibolt hinged scraper trap operates. Galt of Neal & Massy, Port of Spain, Trinidad, B.W.I., has been in the United States for the past 2 months visiting manufacturers which his company represents in Venezuela.

Fox, Thornton Executives For Fox Diamond Derrick

Charles L. Fox is president of the newly organized firm of Fox Diamond Derrick Co., Fort Worth,

C. L. FOX

V. THORNTON

makers of the Fox portable mast. A one-time driller and later a drilling contractor, Fox is thoroughly versed in the drilling industry and drilling equipment. He is the originator of the new Fox portable mast which is being manufactured by Steel Engineering Co., Fort Worth, and which will go on the market through supply dealers in late September.

Victor Thornton, president of Steel Engineering, has been named vice president and general manager of Fox. He has been closely associated with the steel industry for a number of years.

McCormick Steel Opens New Warehouse

New McCormick Steel Co. warehouse located at Lubbock, Tex.

McCormick Steel Co. has opened a new 14,400-sq.-ft. steel warehouse in Lubbock, Tex. McCormick is the first large steel company to offer a complete stock of both carbon and alloy steel to West Texas. With a staff of 21 persons McCormick will be able to promptly service West Texas, New Mexico, southern Colorado, and southern Oklahoma from Lubbock.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that four parcels of land totalling approximately 1,00 acres in T. 20 S., R. 34 E., N.M.P.M., New Mexico, within the known geologic structure of the North Lea field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, on October 10, 1951, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, at Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 360.01 acres in Ts. 11 and 12 N., R. 97 W., 6th P.M., Colorado, within the known geologic structure of the Powder Wash field, will be offered for oil and gas leasing in two parcels, through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, September 26, 1951, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Land and Survey Office, Denver, Colorado, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT, Washington 25, D.C., Notice is hereby given that the SE¼NW¼ sec. 28, T. 24 S., R. 38 W., 6th P. M., Kansas, 40 acres, within the known geologic structure of the Hugoton gas field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p. m., Eastern Standard Time, September 26, 1951, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that the E½ lot 7, E½ and SW¼ lot 10, and S½ lot 11 sec. 18, T. 9 N., R. 78 W., 6th P.M., Colorado, within the known geologic structure of the North McCalium field, will be offered in one parcel for oil and gas leasing through competitive bidding, to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, September 26, 1951, when bids will be opened. Details of the lease offering and how and where to file bids, may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Denver, Colorado, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that the NE¼NE¼ (except the S½S½E¼NE¼NE¼) sec. 27, T. 32 S., R. 23 E., M.D.M., within the known geologic structure of the Midway field, California, will be offered for oil and gas leasing, through competitive bidding, to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, September 19, 1951, when bids will be opened. Details of the lease offering and how and where to file bids, may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 424.48 acres in T. 19 N., Rs. 103 and 104 W., 6th P.M., Wyoming, within the known geologic structure of the North Baxter Basin field will be offered in three parcels for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time. September 26, 1951, when bids will be opened. The details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

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Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

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EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

IMMEDIATE delivery complete workover Jackknife rig, and Lowboy mounted Cardwell, Model L, Power Waukesha GKU with 87 double leg mast and wire line and substructure. Details and price on application. Box 3246, Corpus Christi, Texas.

FOR SALE near Seminole, Oklahoma: One Braun, Size G portable distillation unit complete, Serial #7190, located in 24′ x 40′ x 18′ Stefco steel frame sectional steel building. Price $10,000. Cities Service Oil Co.—Patridge—Bartlesville, Oklahoma.

FOR SALE at Russell, Kansas: 1 Durnell Universal Back Crank Pumping Unit. $250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma

502 FEET 10-inch seamless casing, like new, 40 pound, 8 V threads. $5.00 foot. Near Tulsa. 1208 E. 20th St., Tulsa. Phone 3-9232

EQUIPMENT FOR SALE

All or any unitized item of steam drilling rig. Has made one 8,000-ft. well only. National type 34, 8½-in. oil bath draw works, Parkersburg 136-ft. derrick, 12-in. by 12-in. Ideal engine, two 20-in. Wilson Snyder pumps, Oil Well 350-ton companion blocks, B-J 4300 Super-triplex hook, Gray 500-ton swivel, 4¼-in. and 5¼-in. Kelleys, drill collars, complete boiler feed unit, direct driven dreadnaught coring unit, direct driven National M S 20½-in. rotary, two Cameron 13⅝-in. Q R C preventors with all accessories for complete hookup, and lesser equipment to complete rig. All equipment is in strictly first-class condition. Call or write

OILFIELD SALVAGE CO., INC.
P. O. Box 2589 Phone Ch-6914
Houston, Texas

26" O. D. WELDELLS

NEW 26" O.D. x ⅜" Wall Grade "B" Long Radius Seamless Steel Welding Ells. Recommended for 750# ASA Natural Gas Working Pressure.

20	16 degree	Bend
33	19 "	"
23	22 "	"
4	25 "	"
4	28 "	"
5	31 "	"
4	34 "	"
20	37 "	"
22	40 "	"
40	45 "	"

Available for immediate shipment at reduced prices.

THE McJUNKIN SUPPLY CO.
Charleston, W. Va.
P.O. Box 513 — Phone 26-143

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

FOR SALE: U-15 rotary rig in first-class condition. Has 3 NKU Waukesha motors with less than 1 year service. Without mast or drill pipe. $80,000.00. Will consider good 4000 ft. rotary as part payment. Box E-286, The Oil and Gas Journal, Tulsa, Okla.

PIPE THREADING MACHINES

3—#8 Oster Rapiduction, 2½" to 8", 1942
2—6" Landis, 2½" to 6", Late
1—8" Landis, M/D, Late
1—2" Landis, Late
1—#316 Oster, 1¼" to 6"
1—#304 Oster, 1" to 4"

O'Brien Machinery Co.
Div. A, 1545 N. Delaware Avenue
Philadelphia 25, Pa. GArfield 6-1150

EQUIPMENT FOR SALE

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

8" COLLAR BARGAIN
Cleaned $1.75 lots 500 Dallas Columbia Supply. 911 E. Independence, Tulsa, Oklahoma.

STAR DRILLER No. 71 and tools. Truck Mtd. Priced to sell. Ph. or write G. J. Stumpff, Goodyear, Ariz.

CASING

Have 6,000′ of 9⅝" 36 lb. J-55 Seamless Casing on order for third quarter delivery. Would like to trade this tonnage for 5½" or 7" seamless suitable for 9,600′ well. Phone 3-8601, Shreveport, Louisiana.

FOR SALE

Good Used 48-L and 36-L Bucyrus-Erie Drills—Complete with Tools

BEACON SUPPLY COMPANY
Box 398 Pampa, Texas Phone 3377

EXCELLENT GAS OR FLOW LINE PIPE!

ONCE USED SEAMLESS TUBING—HYDROSTATICALLY TESTED TO 1,000± P.S.I. GOOD AS NEW FOR ALL PURPOSES:

136,000′	1½" O.D. x .135" Wall	1.62±	14′ & Over.
50,000′	2" O.D. x .140" Wall	2.70±	14′ & Over.
10,000′	2" O.D. x .170/.210" Wall	3.80±	10′-16′.
100,000′	2¼" O.D. x .120" Wall	3.20±	14′ & Over.
20,000′	2½" O.D. x .130/.160" Wall	3.72±	14′-26′.
7,500′	2½" O.D. x .175/.215" Wall	4.68±	16′-26′.
30,000′	3" O.D. x .150" Wall	4.06±	14′ & Over.
20,000′	3" O.D. x .220/.270" Wall	7.30±	16′ & Over.
40,000′	3" O.D. x .270/.320" Wall	8.70±	20′-40′.
20,000′	3¼" O.D. x .135" Wall	4.49±	14′ & Over.
50,000′	3½" O.D. x .135" Wall	4.85±	14′ & Over.
5,000′	3¾" O.D. x .370/.438" Wall	14.5±	10′-20′.
80,000′	4" O.D. x .150" Wall	6.17±	14′ & Over.

BRAND NEW ELECTRIC WELD PIPE, BEVELED ENDS:

50,000′	4½" O.D. x .188" Wall	8.64±	30′-40′.

FOR COMPLETE DETAILS AND PRICES, PHONE OR WIRE COLLECT

A. J. STRUBEL, Broker

SIDney 1781 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

EQUIPMENT FOR SALE

PIPE
ALL SIZES; LINE PIPE AND CASING; TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO. PHONES 933 OR 1296, DRUMRIGHT, OKLA.

FOR SALE at Madison, Kansas: Used 8" x 3¼" x 8" Ingersoll-Rand Vertical 2 Stage Compressor Unit, Serial #PP63278 for belt drive. $250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

NEW CASING AND TUBING

Will furnish at regular prices for reasonable working interest in proven producing property. Advise complete particulars with map attached. Box E-340, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE
OIL TANKER

Excellent Condition—Surveyed

Built 1945. Diesel driven. 5400 bbls. 174' x 33' x 13'.

Marine Division

Nat'l Metal & Steel Corp.

Dept. 25, Terminal Is. (Los Angeles Harbor), Calif. Ph: Los Angeles — Nevada 6-2517.

FOR SALE

10,000 FEET 4" O.D. x .054" WALL SEAMLESS ALUMINUM TUBING

Spec. Alcoa 63 St 6—40 ft. Lengths

Working Pressure to 250 P.S.I.

Excellent for irrigation line, water service, etc.

Complete with galvanized 4 bolt Dresser Heavy duty couplings

ALL USED ONLY FEW MONTHS—CONDITION PERFECT

Prompt Shipment subject to prior sale. Price including couplings—51c foot

F.O.B. White Haven, Pa.

L. B. FOSTER COMPANY

New York City—Pittsburgh—Chicago Houston

EQUIPMENT FOR SALE

FOR SALE at Ponca City Refinery—1 used Westinghouse Air Brake Co. No. 3-T Triple Valve Test Rack. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

20 No. 1 Tobey Gas Meters, good condition, recently taken out of service. $250.00 for the lot. R. S. Thompson Co., 29441 Detroit Rd., Westlake, Ohio. Ph. Trinity 1-1982.

FOR SALE: One super model Wilson single drum servicing unit, 80 hp. Waukesha, 4,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

FOR SALE: 35 HP Lufkin Pumping Unit. 74 inch stroke. Complete. Excellent Condition. Arnold Pipe & Supply Company, Box 3003, Shreveport, La.

FOR SALE: New shooting or water truck. 700 gal. vacuum loaded tank, fifteen foot pipe bed, on 1951 Dodge 2 ton, 2 speed, 8:25 tires, powder and cap boxes. Box E-320, The Oil and Gas Journal, Tulsa, Oklahoma.

TUBING & CASING for Sale, all sizes and quantities, New and Used. Box E-338, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 2—18' x 36' Braden Sectional Steel Corrugated Iron Buildings erected in Seminole Field. $450 each. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE

10 x 15 Connersville Meter #12762—55000 cu. ft. per hour rating—125 psig. W P. Equipped with Foxboro PVTT Gauge. Factory reconditioned. Proof curve available. Located our Bluffton, Indiana, Warehouse.

Phone or Write

L. A. MUSSMAN

PANHANDLE EASTERN PIPE LINE COMPANY

1221 Baltimore
Kansas City 6, Missouri
Phone Baltimore 3700

Two 175 H.P.
HEINE BOILERS

Type "M" 250 pound pressure. Good condition. Prompt shipment. Tubes 3½" diameter No. 9 B.W.G.

Wire, write or phone for price.

X-755

EQUIPMENT FOR SALE

FOR SALE at Ponca City Refinery: 1—5' by 25' Used Vertical Concentrator, 2 Piece Shell ⅞" Steel, Heads 1", Vertical Seams Double Buttstrap, Triple Riveted; Girth Seams, Lap Joints, Double Riveted; All Seams Welded Inside and Outside; Rivet Heads Welded Outside; Original Test Pressure 500#. $850.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—"Caterpillar" D-17000 Diesel Electric set, 440 V, 3-phase, 60 Cycle, AC radiator W/blower fan, safety device, muffler, and Firestone vibration dampeners. 2—Fuel Tanks and connections. 1—Steel Building for Caterpillar. Terms Cash; Can be seen at our McMackin Lease, 3 Miles West of Salem, Illinois. No Junk. Absher & Booth, 721 Thompson Building, Tulsa 3, Oklahoma.

FOR SALE

20,000' 5½" O.D. 14 lb. 8 round range 2
20,000' 5½" O.D. 15.5 lb. 8 round range 2
10,000' 5½" O.D. 17 lb. 8 round range 2

FRANK MORRIS & CO.
424 So. Cheyenne, Tulsa, Oklahoma
Phone 2-6248

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted immediate delivery. Also Byron Jackson Carter Centrifugal Units Westinghouse 20-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3437—Houston, Texas

FOR SALE—SHOPPED AND TESTED

15000'—5½" OD 14# Seamless R-2 8R—once run casing.
8000'—7" OD 17# Seamless R-2 8R Casing—once run.
5000'—7" OD 20# Seamless R-2 10V Casing.
5000'—7" OD 24# Seamless R-2 10V Casing.
10000'—2⅞" EUE 8R R-2 Seamless Tubing—once run.
10000'—2⅞" EUE R-2 10V Seamless Tubing.

We also carry a large line of Lapweld Casing and Tubing. Please call us.

SABINE MACHINE & SUPPLY CO.
Phones 3094-3095-3436 Kilgore, Texas

TOWERS and EXCHANGERS

1—7'6" ID x 72' OVERALL x 1.68" THICK TOWER

470# w.p. 4'5" of shell and all nozzles and manways Hastelloy lined, wt. approx 190,000#.

2—7' ID x 117'6" OVERALL TOWERS

Shell 11/16" and 13/16", top head 11/16", bottom head 13/16", 50 CI bubble trays w/49 and 43 caps per tray on 24" and 30" spacing, wt. 206,580#.

1—CONDENSER, 2035 SQ. FT. SURFACE

Single pass shell, 6 pass tubes, 648—¾" O.D. Seamless steel tubes, 13 BWG, 16' long, 1" sq. pitch, shell 34" OD x ⅜" thick, wt. 18,268#

Please wire, phone, or write for additional information

NEWMAN'S, INC.
700 S. Maybelle, Tulsa, Okla.
Phone 2-5228—LD-635

FOR SALE

PIPE—TANKS—EARTH MOVING EQUIPMENT

Approx. 7 miles 3" & 4" T.&C. line pipe.

14—Joints 5 5/16" Drill Pipe and Tool Joints.
3— 45 bbl. 1 Ring Cone Deck Bolted Tanks.
1— 500 bbl. 2 Ring Cone Deck Bolted Tank.
1—1,500 bbl. 3 Ring Cone Deck Bolted Tank, Insulated.
2—2,000 bbl. 2 Ring Cone Deck Bolted Tanks with Heating Coils and Boiler.
2—3,000 bbl. 3 Ring Cone Deck Bolted Tanks.
1—Caterpillar D-8 Cat & Dozer.
1—Caterpillar #28 Ripper.
1—Allis-Chalmers Model A.D. 4 Grader.

Above Material and Equipment is now located near Craig, Colorado.

R. H. TECKLENBORG CO.
Harbor Hotel, Steamboat Springs, Colorado

EQUIPMENT FOR SALE

3—290 Brl. National steel welded stock tanks, with walkway and stairs. Write Box 1581, Tulsa, Oklahoma, or Phone 5-3545.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

THE FOLLOWING used equipment located in South Texas: 2—60 HP Fairbanks-Morse Model 47A13 Gas-Diesel engines now equipped for Diesel operation, single cylinder horizontal 14" x 18" each with two flywheels, 175-385 RPM, serial numbers 788306 and 787864 with 4" size number 4 fast flexible couplings. 2—Radiators with fans that have been used for cooling 60 HP continental engines described as follows: Star Radicooler serial #6601, Star Manufacturing Company, Oklahoma City, style 60-70 air cap. 7,000 CFM, water cap. 30 GPM, consists of: 30" x 39" tubular radiator, 1-28" diameter 6 blade fan, 1-2" single style center pump, 1-4 groove sheave on fan shaft 5⅜" OD "B" section, unit mounted on channel iron base 33" x 52", 6" x 1⅞" x 7/32". Buda Engine Sales & Service, Inc., Box 1159, Tulsa, Oklahoma.

FOR SALE ! !

28,000 FEET 2⅞" O.D. J-55 6.4#

RANGE 2 10 ROUND THREAD NON-UPSET SEAMLESS TUBING

This is new tubing—Used one time for Testing Well and Pulled Immediately!

A. J. STRUBEL, BROKER
4946 Murdoch, St. Louis, Mo.
SIdney 1791 (Day Phone)
HUdson 8152 (Night Phone)

EQUIPMENT WANTED

WANTED: Good National 50 Rotary Rig or Rig of similar capacity also sub-structure and blowout preventers for same. Write John E. Carlson, 1000 First National Bank Building, Peoria, Illinois. Phone 4-6146.

125 HP to 300 HP, 300-lb. working pressure boilers wanted. Near Midland, Texas. Tex Harvey Gasoline Plant, 714 Atlas Life Bldg. Phone 54-5201, Tulsa, Oklahoma.

WANTED—10¾" or 9⅝" Regan blowout preventer. State price and location. Folk Drilling Co. Phone 443, 614 Main, Yukon, Okla.

WANTED FOR CASH

Electric Motors—Starters, Transformers —Oil & Air Brkrs. Wire—Cable—Wiring Materials.

Send Listings

ALLIED ELECTRIC & MACHINERY CO.
1007 Falls Bldg., P. O. Box 1838
MEMPHIS 1, TENN.

WANTED TO BUY:
NEW — SURPLUS — USED
OIL STORAGE TANKS

Capacity 20,000 gallons and other sizes. Mounted or Dismounted.

Box E-336, The Oil and Gas Journal, Tulsa, Oklahoma.

TRADE WANTED FOR ANY QUANTITY!

1) 6" NEW STANDARD PIPE
2) 5½" O.D. or 7" O.D. USED or NEW SEAMLESS CASING
3) 2" AND 2½" USED OR NEW UPSET TUBING

FOR

EQUAL TONNAGE OF 4" NEW STEEL LINE PIPE

WIRE OR PHONE COLLECT

A. J. STRUBEL, BROKER
4946 Murdoch, St. Louis, Mo.
SIdney 1791 (Day Phone)
HUdson 8152 (Night Phone)

EQUIPMENT WANTED

WISH TO BUY: Oil field equipment, gasoline engines, pumping units, etc. Tulsa Supply Co., P.O. Box 294, Tulsa, Oklahoma.

WANTED: Pipe threading machine 1" to 3" or 4" with or without bolt dies. J. V. Lindsey & Son, Box 16, Texline, Texas.

WANTED: Bucyrus Erie 22 W or IDCO-16. Give location and price. J. P. Feighny, Wheatland, Wyoming.

WANTED: CABLE TOOL MACHINE, depth 3500' complete with tools. Give price and location first letter. Box 198, Gorham, Texas.

FOR SALE—MAPS

NORTH DAKOTA MAPS—Base Map of North Dakota: County outline, Township and Range, location of wells and Operators name with total depths. Oil and Gas Fields. 1" = 8 miles. Price $5.00. COUNTY MAPS: Fee ownership and lease with expiration dates. Scale 1" = 4,000 Ft. Northwest Mapping Co., 1171½ Fourth St., Bismarck, North Dakota.

REAL ESTATE

IDEAL MOUNTAIN HOME: Year round completely furnished, 35 x 35 Modern 4 bedroom, bath. Large living room with fireplace, Sunroom, Dining room, Youngstown Kitchen, Basement, Garage and Oil Furnace. On Bear Creek Canyon, 23 miles from Denver. Photos on request. By owner $12,000. R. E. Byrnes, Kittredge, Colorado.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma

HELP WANTED

MAJOR OIL COMPANY requires graduate engineer, prefer operating and maintenance experience in gasoline plant, cycling plant, pressure maintenance plant, or refinery. Incumbent will assist plant superintendent in all phases of plant operation with specialized duties in connection with plant maintenance. Please reply to P. O. Box 2819, Dallas, Texas.

DRILLING CO. DESIRES experienced man familiar with oil field equipment. Duties, checking prices and keeping material records. Supply store experience preferred. Position in Tulsa Office. Reply giving past employment record and salary expected. Box 342, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
SAFETY ENGINEER

A large American oil company in South America requires a thoroughly experienced safety supervisor. Must be a graduate engineer and have five years' experience in supervision of drilling and production safety programs. Will be required to organize and conduct safety conferences, make safety inspections of operations, and make appropriate reports to management.

Write giving age, education, marital status, and complete details of past experience.

Box 306-W
Radio City Station
New York 19, New York

HELP WANTED

WANTED: Assistant plant manager for petroleum wax compounding plant. Experience in petroleum refining desirable together with necessary plant experience in gauging tanks, pipe work, pumping petroleum products, etc. Plant located New Jersey within 25 miles of New York City. Box E-345, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED IMMEDIATELY: Drilling Contractor for Central Pennsylvania to drill one 8,500-foot Oriskany well and ten shallow 2,000-foot wells. Future very great in these new gas fields. Will back and equip ambitious, competent driller who is a pusher. Contact immediately Winner & Murphy, 218 E. Water St., Lock Haven, Pa.

EXPLORATION ECONOMIST: Excellent opportunity for qualified applicant. Position requires five to ten years experience in oil industry statistics and economics. Prefer college graduate with concentration in economics and accounting. Must have practical knowledge of exploration problems and be familiar with general activities in the industry. Age thirty to forty. Salary open. All replies held confidential. Box E-341, The Oil and Gas Journal.

WANTED
ENGINEERS
AND
DRAFTSMEN

Phillips 66

Unusual opportunities for outstanding and experienced men

Phillips Petroleum Company has excellent positions now open for:

Design Engineers
Mechanical, Structural
Electrical, Architectural
Equipment Inspection Engineers
Field Construction Engineers
Concrete and Soils Engineers
Metallurgists
Mechanical Draftsmen
Illustrative Chart Draftsmen
Map Draftsmen
Patent Draftsmen

You owe it to yourself to investigate these opportunities in well paid, challenging careers.

Liberal employee benefits. Group Life Insurance . . . Hospitalization . . . Retirement plan.

Send complete summary of your education and experience to:

PHILLIPS
PETROLEUM COMPANY
EMPLOYEE RELATIONS DEPARTMENT
BARTLESVILLE, OKLAHOMA

WANTED
Aggressive Purchasing Agent

For well established oil well supply company. General office in Oklahoma City. Must be experienced in Oil Field Supplies. Drilling and Production equipment. State experience, age and qualifications—all replies held strictly confidential.

BOX E-307, THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

PRODUCTION Superintendent or Production Engineer to manage producing leases and drilling wells for small company. Experience with water flood desirable. Give experience and age in letter, and also salary required. All letters confidential. Address Box E-335, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WAREHOUSEMAN — Oilfield, for small wildcat operation in Arabia. Must be capable assuming full responsibility ordering stock control disbursing. One year contract. Top wages. Living furnished. No family accommodations. Reply stating age, education, experience. Box E-343, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS NEEDED

BY

ENGINEERING DIVISION, PRODUCTS PIPE LINE DEPARTMENT, STANDARD OIL COMPANY (INDIANA)

MECHANICAL	VALUATION
STRUCTURAL	ELECTRICAL
CIVIL	ESTIMATING

HYDRAULIC

Opportunities exist in a permanent organization for both recent graduates and experienced engineers. Experience in pipe line work is desirable but not essential. Write giving full educational and experience resume; including transcript of college credits. Address replies to:

CHIEF ENGINEER

PRODUCTS PIPE LINE DEPT., STANDARD OIL CO. (IND.)
910 South Michigan Ave.
Chicago, Illinois.

CAREER OPPORTUNITY FOR CHEMICAL ENGINEERS

Southern California

RESEARCH ENGINEERS. Work is in the field of unit operations, with emphasis on heat-transfer and distillation. Must have advanced degree in chemical engineering and three years or more experience in unit operations, plant-design, or process development for the petroleum or chemical industries. Should be familiar with construction and operation of pilot-plants or full scale commercial units.

PROCESS ENGINEERS. Prefer men with advanced chemical-engineering degree. At least two years experience in process design of petroleum refining or petro-chemical process plants. Must be able to meet customers.

Please send a detailed summary of your education, experience, and personal history. Also include a recent photo of yourself. All replies will be kept confidential. Address your letter to Personnel Department.

C. F. BRAUN & CO.

Engineers Fabricators Constructors Consultants

1000 South Fremont Avenue, Alhambra, California

HELP WANTED

REPRESENTATIVE WANTED—New and used Tube case, and line pipe. Liberal commission. Contact Luside Metal Co., Inc., 805 Granite Bldg., Rochester 4, N. Y.

PRODUCTION SUPERINTENDENT: Progressive independent company looking for man who knows production—look after producing and drilling wells—be able to handle men—a good job for the right man. Write, giving age, experience and salary expected. All inquiries strictly confidential. Address Box E-334, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

GEOLOGIST for aggressive well established producing company. Must have at least six years experience in the Gulf Coast Area and be capable of supervising land deals. If interested, submit details of experience, military status, and salary expected. All replies will be kept confidential. Box E-318, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN gravity-magnetic supervisor. Must be of standing in field. Top salary, subsistence, family living allowance and travel expense. Best working conditions. Our personnel has been notified. Apply Box E-262, The Oil and Gas Journal, Tulsa, Oklahoma.

MAGNETOMETER operator, foreign work. Top salary, subsistence, family living allowance, traveling expenses. Excellent conditions and climates. Our personnel has been notified. Apply Box E-263, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-264, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Petroleum or Mechanical Engineers for oil tool design. Field experience desirable. State age, education, experience and salary expected. Box E-319, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Research and Development Engineer capable of taking charge of department with Oil Field Equipment Manufacturer. Reply giving complete resume stating age, education, experience, positions held, and salary expected. All replies confidential. Box E-346, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
REFINERY
SECTION FOREMAN

An American oil company in South America requires a refinery section foreman. Must have qualified experience in full charge of refinery unit operation. Will be responsible for operation of two Foster Wheeler combined distillation units; one crude distillation shell still; and one aviation and specialty unit.

Write giving age, education, marital status, and detailed experience resume. Your reply will be held in strict confidence.

Box 308-C
Radio City Station
New York 19, New York

WANTED
ELECTRICAL SUPERVISOR

An American oil company in South America requires a graduate Electrical Engineer with a minimum of two years' field experience in electrical maintenance and construction. Will be required to coordinate and supervise operative tests and maintenance of FM and AM communication sets, telephone equipment and circuits, and power distribution circuits.

This is a staff position offering retirement plan and other employee benefits. Write giving age, education, marital status, and details of previous experience. Your reply will be held in strict confidence.

Box 308-B
Radio City Station
New York 19, New York

HELP WANTED

HELP WANTED

WANTED

EXPERIENCED PRODUCTION SUPERINTENDENT

With Independent Company for East Texas Fields.

State age, experience, references and salary expected

Box E-312, The Oil and Gas Journal, Tulsa, Oklahoma

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL

for

LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

OVERSEAS POSITIONS

An American oil company in South America has positions open for qualified technical personnel.

Refinery Chemist—Must have a college degree and a minimum of four years' experience in oil refinery control laboratory. Experience in manufacture of lube oils and greases desirable. Single man preferred.

Mechanical Engineers—Engineering degree and minimum of five years' experience in mechanical drafting and design of oil refinery or chemical plant process piping and equipment.

Electrical Engineers—Must have E. E. degree and five years' experience in design, operation, and maintenance of electrical installations in oil refineries or chemical plants including generators, motors, motor control, and switch gear.

Mechanical Foreman—Must have eight to ten years' experience in maintenance and repair of all types of pumps, compressors, and motors pertaining to oil refinery operations. Will be required to supervise and coordinate the activities of mechanics in installation, maintenance, and repair of this equipment.

Maintenance Engineers—Mechanical or Electrical Engineers with a minimum of five years' experience in a modern oil refinery to work in coordination and supervision of maintenance and construction.

Corrosion Engineers—Degree and minimum of five years' experience in corrosion engineering. Will be required to make studies and investigations of causes and nature of corrosion pertaining to equipment utilized in oil producing operations.

Pipeline Engineers—Degree and four to ten years' experience in design and construction of pipelines, gathering systems, pump stations, tank farms and terminals.

Drilling Engineers—Degree and minimum of three years' experience required. Will be required to maintain and analyze records on drilling equipment performance and make recommendations to improve the efficiency of drilling operations.

Equipment Inspectors—Graduate Engineers with minimum of four years' experience in refinery inspection required.

Pipeline Foreman—Will be required to supervise maintenance and construction of trunk pipeline system.

Write giving age, education, marital status, and details of previous experience. Your communications will be held in strict confidence.

BOX 308-S—RADIO CITY STATION

New York 19, New York

SITUATIONS WANTED

GEOLOGIST 4 years foreign experience in subsurface exploration and development. Available immediately. Box E-339, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Production and Drilling Supt. on both Rotary and Cable Tools, Deep and Shallow wells, work over and completion, Material, Equipment, routine office duties. 39 years of age. Best reference. Box E-234, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED, practical man—Age 62. Thirty years cable tool driller, 15 years tool pusher, work over and Production Superintendent. Would like to tie in with Independent Oil Company who needs a man to work over and build up run down production. Box E-347, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: B.S., married, draft exempt; 26 years old; one year's experience in subsurface and surface geology in South America. Interested in foreign or domestic. At present employed. Box E-300, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT experienced in cable and rotary tool completion and new lease development. Box E-317, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST desires connection with oil company exploration department in southwest. Fourteen years experience with contract seismograph company includes computing, interpretation, crew management, special supervision, research. Box E-325, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

OIL & GAS ENGR. desires position in pioneer development. Capable of assuming complete operational supervision. Domestic or foreign service. Box E-308, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: M. S. Degree Economics, desires domestic or foreign position as assistant to management of oil or chemical company. Age 38. Thirteen years domestic and foreign experience refinery operations, petrochemical plant management, and process design for plant construction. Box E-330, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED REFINERY Foreign Operating Superintendent — Age 37 — Successful administrator foreign staff Middle East, Latin American areas major operations. Box E-332, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION OIL EXECUTIVES: If your days are short—it is possible that too much of your time is taken up with details that could be handled by an able assistant. I am 34 years old, family man, and well qualified for just such a job, having had 15 years experience in field and office, working direct with engineers, geologist, landmen, and executives. I have a reliable reputation throughout the oil and gas industry in public relation and technical phases. Desire to make permanent connection with reliable operator. Box E-285, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE

SEVEN producing wells in Southern California, shipping approx. 3000 bbls. per month. New pumping equipment, electric powered. Plenty of tanks. Lycoming 21275 or P.O. Box 350, Pomona, California.

FINANCING

YOUR FINANCING PROBLEM can be solved at moderate cost. For details write Box E-241, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

MONTANA ROYALTIES
Millions of acres now leased by world major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1222 Great Falls, Montana.

LEASE AND DRILLING BLOCKS

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat lease-drilling propositions and small producing properties; all in shallow territory. W. F. Harley, Bowling Green, Ky.

IF you are interested in LEMMON-WILLISTON basin of SOUTH DAKOTA write me. Minerals, leases, drilling blocks, royalties or over-rides also represent you at State School Land auctions. JOHN F. SCHOOF, GETTYSBURG, S. D.

6,500' 5½" 15.5 lb. J-55 Long T&C casing available for interest in producing oil or gas well. Box E-299, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Will purchase acreage to support wildcats in Kansas, Colorado, and Nebraska and consider drilling deals western Kansas and Julesburg Basin area. Submit details to Box E-296, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE: 48-acre oil lease, 4 wells producing, two pay sections of Strawn Oil sand 1500 ft. and 1600 ft., new field, last well completed Aug. 20th, 1951, potential 31½ bbls. per day of 40 gravity oil. Five or more proven locations to drill. For quick sale price $100,000—O. B. Klein, P.O. Box 464, Taylor, Texas. Phone 307.

FOR SALE: 360 acres 13 miles southwest George West, Live Oak County, Texas. 120 acres cultivation, two water wells, house and good fences. 160 royalty acres, balance royalty expires 1960. Leases expire 1953 and 1955. Production and drilling two miles northeast and southwest. Price $125.00 per acre. Owner, W. H. Striebeck, Jr., Box 155, George West, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

FOR LEASE: The west 80 acres of the northwest ¼ of Section 21 T. 13 R. 34 in Northwest Lea County N. Mexico. D. H. McDaniel, 3215 Fairway Drive, La Mesa, California.

EXPERIENCED, retired Oil Field Superintendent will help finance, drill and promote shallow leases. Box E-348, The Oil and Gas Journal, Tulsa, Oklahoma.

IF INTERESTED in leasing California Claims in San Bernardine Base and Meridian, Township 12 S. Range 16 E. Write C. W. Deming, Box 1874, Tulsa, Okla. Box 320, Waycross, Ga.

WANTED TO DRILL IMMEDIATELY

A Lease That Is Off-Set to Production. Submit full details to

NELSON B. CRAMER
2831 East Ocean Boulevard
Long Beach 3, California

DRILLING DEALS — WEST TEXAS

We are in position to offer drilling deals on good geology to independents and companies. Will furnish complete data upon request. Reply:

Box E-333, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

BUSINESS OPPORTUNITIES

AGGRESSIVE subsurface geologist desires to sell to smaller company that wants to find production in southern Oklahoma—a good education and ten years' experience in Ardmore. Shall expect to grow in proportion financially, as the company grows. Box E-322, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED to buy from owner, producing oil property, preferably 1200 bbl. per day or more from either shallow or deep horizon or both. In reply please state daily production, number of producing wells, total average, potential and other essential information. Box E-327, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: THOSE DESIRING TO INVEST IN OIL BUSINESS IN MID-CONTINENT AREA. Highclass Geologist, associated with competent lease man and Drilling and Production Supt., desires to contact parties wishing to invest. We can furnish Geology, take leases, do title work, work out satisfactory drilling deal, drill the well and produce it. Will take interest as compensation. Box E-326, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

$350,000 to $500,000

Working Capital for 5,000 bpd topping refinery well located on Gulf. Complete refinery and facilities ready to operate. Crude available, markets assured.

Box E-344, The Oil and Gas Journal, Tulsa, Oklahoma.

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NATIONAL *Answers* THE *Demand!*

The phenomenal growth of the petroleum industry, through the past 25 years, has created a tremendous demand for larger, faster, highly specialized equipment to serve the industry.

The National Tank Company, as a part of its contribution to the fast growing oil business, now has the equipment to roll a 3½" thick by 10' wide steel plate into a 35" I.D. cylinder. The steel is heated before bending, in a giant furnace with a heating capacity of 2000°F., usually 1800°F. is adequate.

If you need oil industry, chemical or manufacturing installations or pieces of equipment that are engineer-designed, field tested and built to handle large volumes safely and efficiently, be sure "It's a National"!

It's a National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

BRANDS are important!

Cattle are branded primarily to prove ownership.
But, experienced cattlemen and livestock buyers know that
some brands are always found on higher quality animals.
These brands come from better feed and water,
from better breeding stock, from better handling.
The HAZARD brand on a reel of wire rope is your assurance of quality—
quality backed by wire rope manufacturing experience
dating back to 1848. Next time specify HAZARD.
Remember— **"Brands are important!"**

ACCO *In Business for Your Safety*

AMERICAN CHAIN & CABLE
HAZARD WIRE ROPE DIVISION

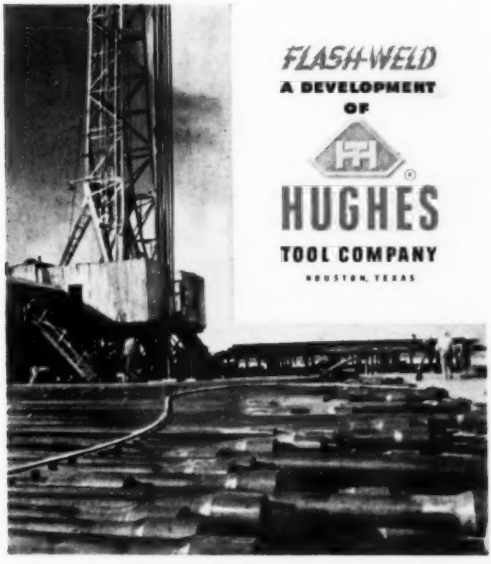
TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, Odessa, Tex., Pittsburgh, San Francisco, Bridgeport, Conn.

Are you Discarding Salvageable Drill Pipe?

In these days of drill pipe shortages, it may pay you to take a second look before discarding your pipe.

Many operators are now making hole with pipe reclaimed from castoff strings through the use of HUGHES Flash-Weld Tool Joints. These joints eliminate threaded pipe connections and make it possible to incorporate many different types of pipe in a single string. As a result, drill pipe that otherwise would not be used, is now being salvaged.

Regardless of pipe end design, any good drill pipe—with sufficient upset—can be converted into a uniform, dependable drill stem by using HUGHES Flash-Weld Joints.

Ask your local HUGHES representative about the cost of unitizing your drill pipe remnants with HUGHES Flash-Weld Tool Joints...the tool joints with the proven performance record!